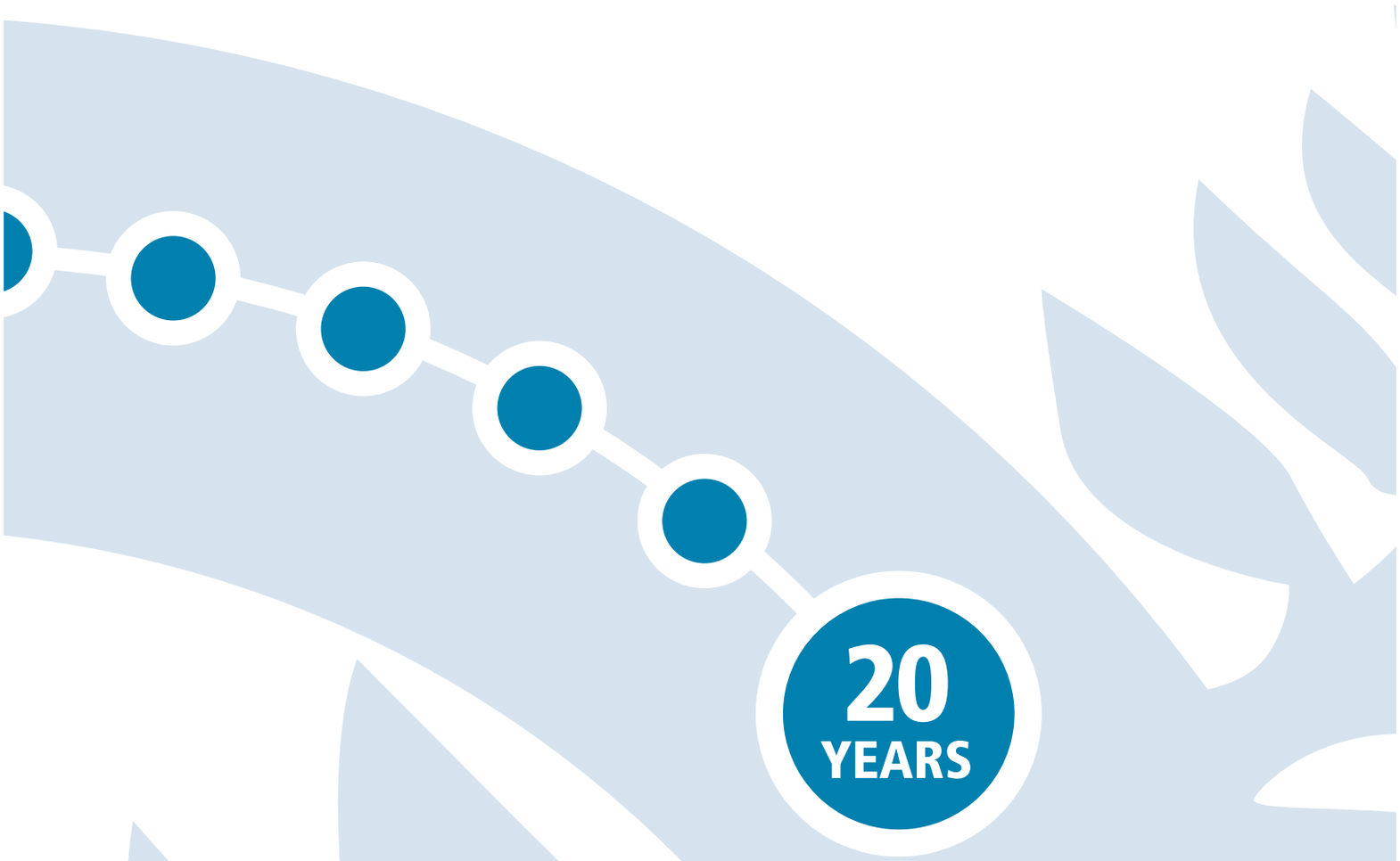
THE NEW ZEALAND JOINT REGISTRY

TWENTY YEAR REPORT
JANUARY 1999 TO DECEMBER 2018



NZOA
New Zealand
Orthopaedic Association

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Date of Publication: December 2019

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EDITORIAL COMMENT

The Registry Management Committee is pleased to present the twenty year report of the New Zealand Orthopaedic Association's Joint Registry.

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.

The total number of registered joint arthroplasties at 31st of December 2018 was 303,829, which had been performed on 204,507 individual patients, of which 46,199 (23%) have now died during the 20 year period.

The number of observed component years (ocys) contained within the Registry is now 1.9 million. The increase of 22,271 registered joints for 2018 compared to the 20,699 in 2017 represents an overall annual gain of 7.6%

The mean BMIs are 31.26 (knees) and 29.0 (hips) but there are significant numbers of morbidly obese (BMI>40) people receiving arthroplasties.

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

Hip arthroplasty

There are 135,461 conventional total hip arthroplasties with an overall revision rate of 0.72 per 100 ocys (95% confidence interval; 0.70 -0.73) with a 19 year prosthesis survival of 84.70% (cemented 86.1%; uncemented 84.5% and hybrid 84.10%).

More females than males received a hip replacement (52.93% vs 47.07%), with a slightly higher mean age (68.46 vs 65.45 years), but a very wide range for both (13 to 101 yrs.)

Most had no previous surgery (97.4%) and a diagnosis of osteoarthritis (89.1%). Most operations were performed through the posterior (67.1%) or lateral approach (24.4%).

Approximately 200 hips per year in New Zealand are performed through the anterior approach, and this number has remained steady since 2014, despite its popularity in the literature. Fully cemented hip replacement has fallen from 14% in 2012, but has stabilised at approximately 7% in the last 2 years.

The ceramic on polyethylene bearing surface continues to increase in popularity rising from 42% of the total in 2017 to 48% in 2018.

The proportion of the metal on metal articulation continues to decline and in 2018 was less than 1% of the total, all with head sizes < 32mm.

The most popular head size overall remains the 32mm and in 2017, this was used in 60% of primary arthroplasties. In 2018, this was used in 62% of primary arthroplasties.

However, the percentage use of 36mm head sizes remained steady in 2018, similar to its use in 2017.

On the other hand, metal on metal articulations fare poorly when revision rates are analysed against head size, bearing surface materials, age bands and cemented/uncemented/hybrid variants of the same prosthesis. Further reinforcement is from the survival curves for bearing surfaces.

The use of cross linked polyethylene remains the dominant choice again accounting for in excess of 90% of all polyethylene used (92% compared with 94% in 2017).

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 74 years. The data shows that overall the hybrid hip has the lowest revision rate.

There are 1,092 hip prosthesis combinations in the Registry but only 227 (21%) with 50 or more registrations.

As with the nineteen year report, this years' report does not include a Table of Revisions vs Hip Prostheses Combinations Sorted on Number of Implantations, since it does not reflect what is currently being used.

Instead we have replaced it with a new Table labelled Revisions versus Hip Prostheses Combinations used in 2018, Sorted on Revision Rate.

This Table reflects prostheses combinations currently being used.

There were 100 different combinations of acetabular and femoral components used in 2018 that had more than 50 operations in the Registry.

Note that the total of prostheses used in 2017 in this table is 8,618, not 9,186, meaning that only 568 (6.2%) "new" prostheses combinations (less than 50 operations in total) were used by surgeons in 2018, a small percentage similar to the 5.4% seen in the 2018 report.

We hope surgeons use this Table to monitor performance of their chosen implant combinations.

The next table, Revision versus Hip Prostheses Combinations Sorted on Revision Rate, has an extra column which includes the number of prostheses used in 2018.

This will allow surgeons to see which prostheses combinations currently being used, may have a higher than average revision rate.

Newly introduced prostheses generally require 3 years for their revision rates to reach surgical significance.

Comparison of the 2018 Column and the No. of Ops. Column can identify these.

> " 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."

The Corail/Pinnacle combination was again the most popular in 2018, with 1,471 primary arthroplasties.

Second most popular in 2018 was the Exeter V40/ Trident combination, with 1,049 primary arthroplasties. Both have revision rates well below the NZ mean, 0.68 and 0.43 ocys respectively.

The Exeter V40/Continuum combination identified in last years' report has improved its revision rate in 2018 and is no longer a cause for concern.

In 2018, only 23 patients had operations using prosthesis combinations which had a significantly higher revision rate, compared to 31 patients in 2017.

Otherwise New Zealand surgeons are using (and being supplied with) prostheses combinations that have good track records for revision rate.

Despite last years' report highlighting the Twinsys cemented/ Pinnacle combination having an unacceptable revision rate (10 patients in 2017), a further 8 patients had this combination in 2018.

Although there were no further revisions of this combination in 2018, (total 7), its use should still be questioned.

Similarly, surgeons chose to use the ABGII/RM Pressfit Cup in 12 patients, despite it having a significantly higher revision rate in 2017.

The 2018 revision rate of this combination show the same poor results and its continued use should be questioned.

Resurfacing hip arthroplasty

All BHR's have increased in number in 2018. 118 compared to 94 in 2017, and the third year showing an increase from the low point of their use in 2016. The revision rate has again fallen from a rate of 1.15 ocys in 2017 to 1.06 ocys (0.90 – 1.24).

Knee arthroplasty

110,076 conventional total knee arthroplasties have been registered totalling 753,723 ocys with the overall revision rate 0.48/100 ocys, (95% confidence interval; 0.47-0.50) and the excellent 20 year survival of 92.1%.

The number of TKA's implanted continues to increase, with 8,392 implanted in 2018, a 16.29% increase over 2017.

As was done for recent annual reports, several variants of basically the same knee prosthesis type for example, Nexgen and 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 25 different knee prostheses in the Registry that have a minimum of 50 registrations.

The Triathlon remains the most popular prosthesis in 2018, with the Attune holding second place.

Calculation of revision rates for individual prostheses with a minimum of 50 arthroplasties shows that among the bigger registered numbers the Duracon, although no longer implanted, has the lowest revision rate of 0.321/100ocys.

The Nexgen has the biggest number of registrations at 19,728 with 155,715 ocys and a revision rate of 0.52/100ocys.

Four of the currently used cemented prostheses, Balansys, Persona, Trekking and the Journey and the one fully uncemented prosthesis, LCS has a higher revision rate than the overall rate of 0.48/100 ocys @ the 95% confidence interval.

It is important to note that the use of revisions per 100 component years as an outcome measure will tend to disadvantage newer prostheses such as the Persona and the Attune, as revision for infection occurs more commonly in the first year post implantation.

Although uncemented knee arthroplasty represents just 4-5% of all primary knee arthroplasties, it has a significantly higher revision rate than either fully cemented or hybrid in which the tibial component is cemented and the femoral component uncemented.

In the last two years there has been a small increase in the percentage use of fully uncemented TKA prostheses, reversing the previous trend.

The KM curves for the three types of fixation show that the uncemented curve continues to steeply diverge from the other two.

Similar to other registry findings, analysis suggests that the tibial component remains the limiting factor in uncemented TKA replacement.

The analyses comparing revision rates and survival of fixed versus mobile bearing knees continue to show that there is similar longer term survival for both versions.

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 KM survival graphs, and seems to hold true across almost all brands with both PS and CR versions.

There are 602 registered patello-femoral prostheses, with 71 added in 2018, compared to 65 in 2017.

58 have been revised and the revision rate at 1.91/100 ocys is nearly four times that for total knee arthroplasty. All except six were revised to a total knee arthroplasty.

Again this year revision rate tables and survival curves are included for the five different BMI groupings and, like hip arthroplasty, the morbidly obese (BMI>40) group have statistically significant poorer prosthesis survival.

Unicompartmental Knee Arthroplasty

Unicompartmental prostheses with a total of 87,000 ocys, a mean revision rate of 1.20/100 ocys and a 17 year survival of 79.5%. Pain remains the main listed reason for revision in 52 % of cases where a reason is given.

There were 1,096 registrations in 2018, very similar to the 2017 numbers.

Once again the Oxford uncemented prosthesis was very dominant, accounting for 69% of the unicompartmental prostheses implanted in 2018.

The revision rate is 0.77/100 ocys and this drops to 0.70/100 ocys (0.58 – 0.84) when the medial Oxford UKR's are analysed separately- lateral Oxford UKR's have a revision rate of 1.67/100 ocys (1.06 – 2.51).

The lowest revision rate is currently the Zimmer unicompartmental prosthesis at 0.47/100 ocys.

The overall revision rate is 1.2/100 ocys, however surgeons who perform less than 10 UKR's per year have a significantly higher revision rate – 1.39/100 ocys (1.28- 1.51) compared to surgeons doing 10 or more procedures 1.01/100 ocys (0.92 – 1.11).

Ankle Arthroplasty

There are 1,619 primary registered ankle prostheses with a total of 10,038 ocys.

There were 117 primary ankle arthroplasties registered in 2018.

Shoulder Arthroplasty

There are 10,324 registered primary shoulder prostheses, with a total of 54,864 ocys. An additional 1,074 primary shoulder replacements have been performed in 2018. Over recent time, there is a 6-7% annual growth in the utilisation of shoulder arthroplasty in New Zealand.

Reverse arthroplasty remains the predominant implant in 2018, with 70% of all shoulder arthroplasties being reverse arthroplasty. There is a slow, but steady increase in the utilisation of reverse arthroplasty, predominantly at the expense of hemiarthroplasty. The decline in anatomic shoulder replacement continues and currently represents 23% of all shoulder arthroplasties performed, a decrease of 3% from 2017.

The 10 year survival of all shoulder prostheses is 91.9%, whilst the 15 year revision free survival is 89.4%.

The revision rate of 0.95 per 100 component years for primary shoulder arthroplasty remains steady, as do the rates of total (0.94) and reverse arthroplasty (0.76). The burden of revision surgery in shoulder arthroplasty is increasing, with a 12% increase in revision workload for the 2018 year. 817 revision cases were performed, with pain remaining the primary indication for revision.

Although reverse shoulder arthroplasty has increased revision rates compared to total shoulder replacement during the first two years, reverse arthroplasty outperforms total shoulder replacement with a ten year survival of 96% compared to a rate of 92% for total shoulder replacement.

Partial resurfacing continues to have a significantly higher revision rate than all other groups, with a trend to increasing revision rate from previous years. However, only 2 cases of partial resurfacing were performed in 2018 and 6 cases of total resurfacing, so there is little utilisation of this type of procedure in the current period.

Arthroplasties utilising uncemented glenoids continue to show a 4 times revision rate compared to those having cemented glenoids.

Average Oxford scores remain unchanged from 2018. There is an improvement in scores from 6 months to 5 years, but then the scores stabilise at 10 years. The initial four-point difference in scores for total shoulder and reverse shoulder decreases at 5 years, but the total shoulder scores remain 2.5 points higher at 5 years.

An Oxford score of less than 27 results in a fivefold increase in risk of revision compared to those with a score of 34 or greater.

Elbow Arthroplasty

There are 587 registered primary elbow prostheses with a total of 3,819 ocys.

There were 27 primary elbow prostheses registered in 2018.

Worldwide, Rheumatoid arthritis has decreased and Trauma has increased as an indication for elbow replacement.

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.

The registry data continues to show an increased rate of infection when exhaust suits and laminar flow ventilation is used. This data needs to continue to be interpreted with caution. The data regarding suit use is likely to be accurate and experimental evidence has supported the observation that exhaust suits are counterproductive.

Data on use of laminar flow is likely to be inaccurate with many surgeons unsure of the status of ventilation in the theatres used.

The Registry intends to record the status of all theatres used and have the theatre listed on the data capture form to improve the accuracy of this over time.

Oxford 12 Questionnaire

Six month, 5, 10 and 15 year scores analyses of the individual score categories for primary hip and knee arthroplasties continue to demonstrate that the six-month score is indicative of the longer term outcome.

It is noteworthy that the 15 year scores still have a similar high percentage of excellent/good outcomes as the 6 month, 5 and 10 year outcomes.

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 scoring date for primary hips, knees (including unicompartmental) and shoulders (six months and five years only) has again been demonstrated.

With the very large number of recorded six month Oxford hip and knee scores, the score groupings can be 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.

This year Oxford score analyses for some of the larger number hip and knee prostheses have been undertaken and show that there is little score difference among these prostheses at six months and without exception they have higher (better) scores at five years. For all the knee scores the higher 5 year scores are not only statistically significant but also clinically significant when compared to the 6 month scores.

With regard to shoulder arthroplasty, Conventional Total and Resurfacing Head types have significantly higher six month and five year scores.

Deceased Person's Data

A deceased person's data is valid in perpetuity for all analyses involving the time interval prior to the person's death e.g. if a person dies 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".

John McKie – Supervisor
Toni Hobbs – Coordinator
Chris Frampton – Statistician

ACKNOWLEDGEMENTS

The Registry is very appreciative of the support from the following:

Canterbury District Health Board:

For accommodation and other facilities

Chris Lewis, Information Analyst, Ministry of Health:

For audit compliance information

Mike Wall, Alumni Software:

For comprehensive Information Technology services

DHD Creative:

Final design

FUNDING

The Registry wishes to acknowledge development and ongoing funding support from:

- ACCIDENT COMPENSATION CORPORATION
- CANTERBURY DISTRICT HEALTH BOARD
- MINISTRY OF HEALTH
- ORTHOPAEDIC SURGEONS

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

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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 recognizing 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.

Database

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. These additions have now been discontinued. 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.

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, and they now pay $25 for each joint registered from a private hospital.

The latest MOH contract has been extended for a further 3 years with 4 six monthly payments of $37,500 (excluding GST).

Since 2005 the Southern Cross Hospitals have contributed a grant of $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

Since 2008 each surgeon receives an annual report giving their revision rate for primary registered primary arthroplasties, and this includes their questionnaire responses.

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.

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.

In 2016 the Oxford Elbow Score (OES) and the Manchester-Oxford Foot Questionnaire were introduced replacing the former questionnaires that were not validated.

All patients receiving total arthroplasty of the above joints, as well as unicompartmental knee arthroplasties, are sent questionnaires with a response rate of 70%. As for hips and knees, the questionnaires are sent out 6M post-surgery then at 5Y, 10Y and 15Y.

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. 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 February 2018 again demonstrated a New Zealand-wide public hospital compliance of > 95% when compared to NZHIS data.

Following the introduction of the South Island PICS system at the beginning of October 2018, the Registry lost the ability to search for nationwide NHI entries and was not able to access nationwide date of death registrations.

This has now been overcome, and the data entry staff now use the MOH NHI lookup system to check NHI entries and addresses.

Also, the Registry can now access the nationwide death files through the MOH FTP server with twice monthly updates. Accurate date of death registrations are essential for our statistical analyses.

NZJR Staff

The current staff are data entry (1.75 FTE), Registry coordinator (0.8 FTE), Registry supervisor (0.2 FTE) and statistician (0.04 FTE).

ADDITIONAL ANALYSES

The number of registered joint replacements for the 20 year period to December 2018 was 303,829.

During this period 204,507 individual patients were registered, of which 46,199 (23%) have died.

Bilateral joint replacements carried out under the same anaesthetic;

Bilateral hips

2,545

patients (5,090 hips) 4% of primary hips

Bilateral knees

4,311

patients (8,622 knees) 8% of primary knees

Bilateral Unicompartmental knees

969

patients (1,938 knees) 15% of unicompartmental knees

Bilateral ankles

2

patients (4 ankles)

Bilateral shoulders

5

patients (8 shoulders)

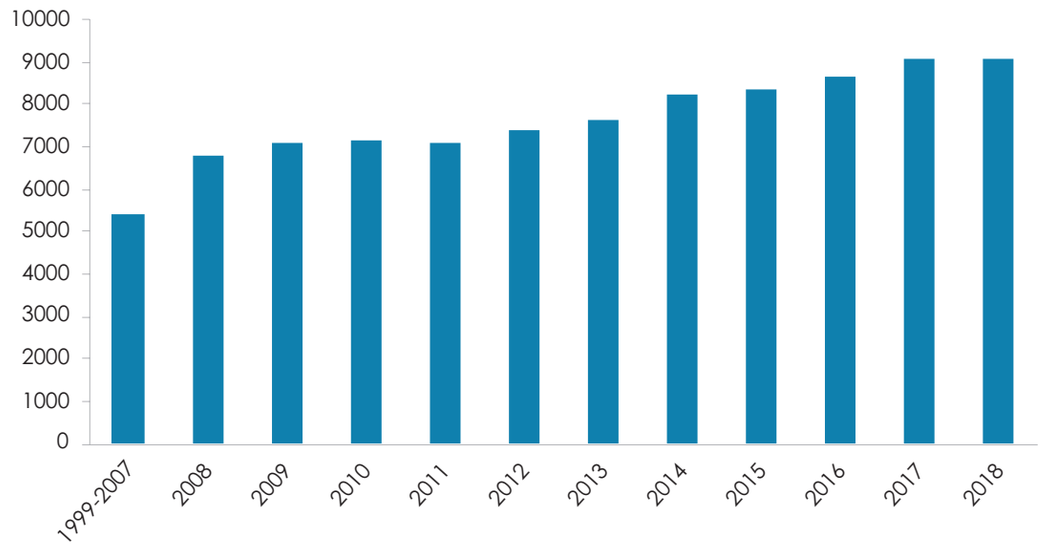
Trainee Surgeons: In the following analyses consultants took responsibility for their registrar surgeon procedures.

HIP ARTHROPLASTY

PRIMARY HIP ARTHROPLASTY

The **twenty year** report analyses data for the period January 1999 – December 2018. There were 137,338 primary hip procedures registered including 1,877 resurfacing arthroplasties. This is an additional 9,186 compared to last year's report.

Number of operations by year



Data Analysis

Age and sex distribution

The average age for all patients with primary hip arthroplasty was 67 years, with a range of 13 – 101 years.

All hip arthroplasty

	Female	Male
Number	72,690	64,651
Percentage	52.93	47,071
Mean age	68.46	65.45
Maximum age	100.95	99.62
Minimum age	13.43	14.64
Standard dev.	11.45	11.49

Conventional hip arthroplasty

	Female	Male
Number	67,526	58,870
Percentage	53.42	46.58
Mean age	68.50	65.77
Maximum age	100.95	99.62
Minimum age	13.43	14.64
Standard dev.	11.44	11.37

Resurfacing hip arthroplasty

	Female	Male
Number	259	1,618
Percentage	13.80	86.20
Mean age	50.00	52.18
Maximum age	65.88	81.44
Minimum age	25.72	17.74
Standard dev.	7.22	8.54

Body Mass Index

For the nine year period 2010 – 2018 there were 49,340 BMI registrations for primary hip replacements. The average was 29.00 with a range of 14 – 65 and a standard deviation of 5.68.

Previous operation

None	131,943
Internal fixation	2,471
Osteotomy	684
Arthrodesis	92

Diagnosis

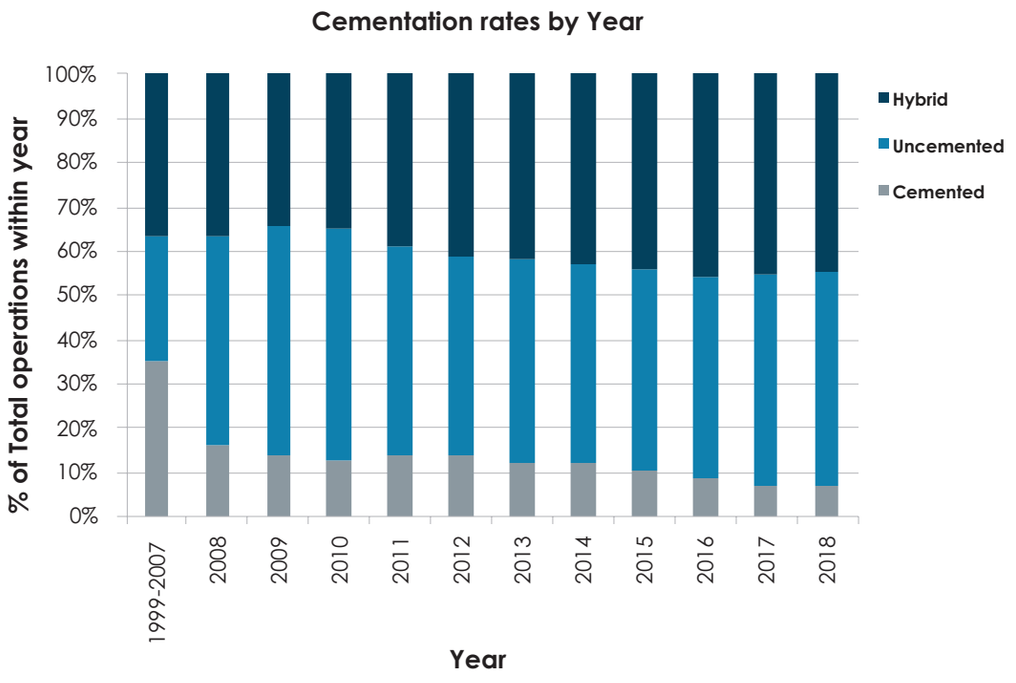
Osteoarthritis	120,688
Acute fracture NOF	5,248
Avascular necrosis	4,105

Developmental dysplasia	2,910
Rheumatoid arthritis	1,660
Old fracture NOF	1,609
Other inflammatory	919
Tumour	632
Post-acute dislocation	353

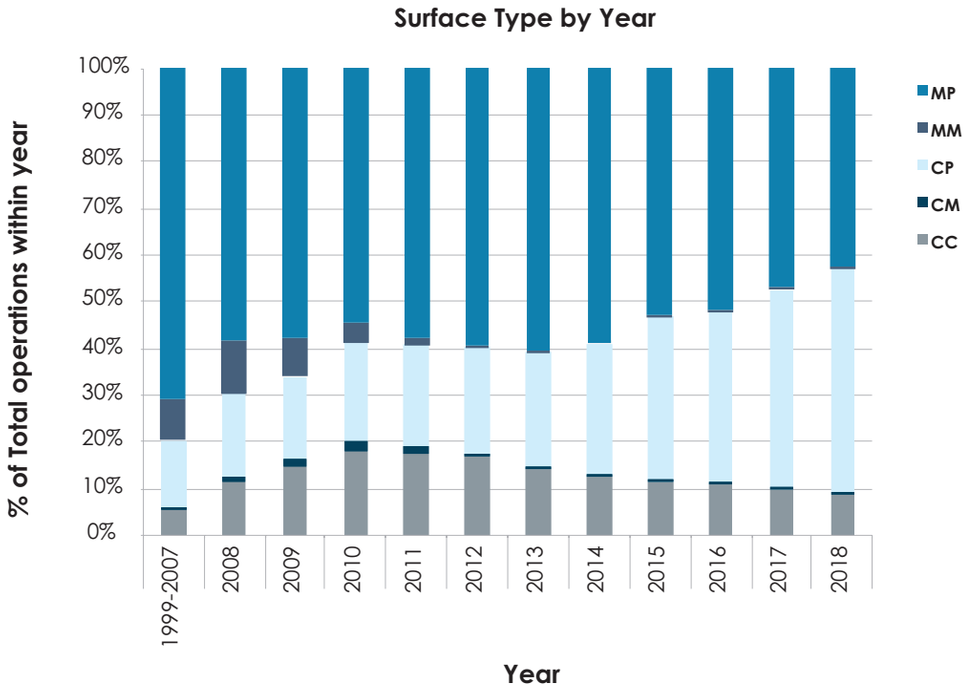
Approach

Posterior	90,913
Lateral	33,007
Anterior	4,623
Minimally invasive	1,905
Image guided surgery	598
Trochanteric osteotomy	225

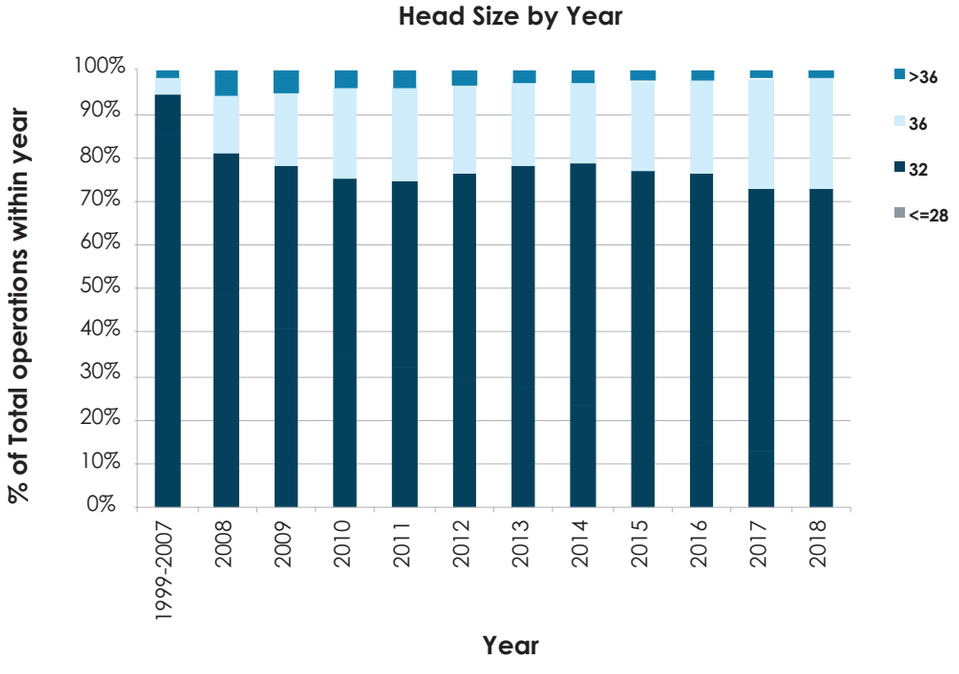
Comparison of proportions of cemented vs uncemented vs hybrid by year



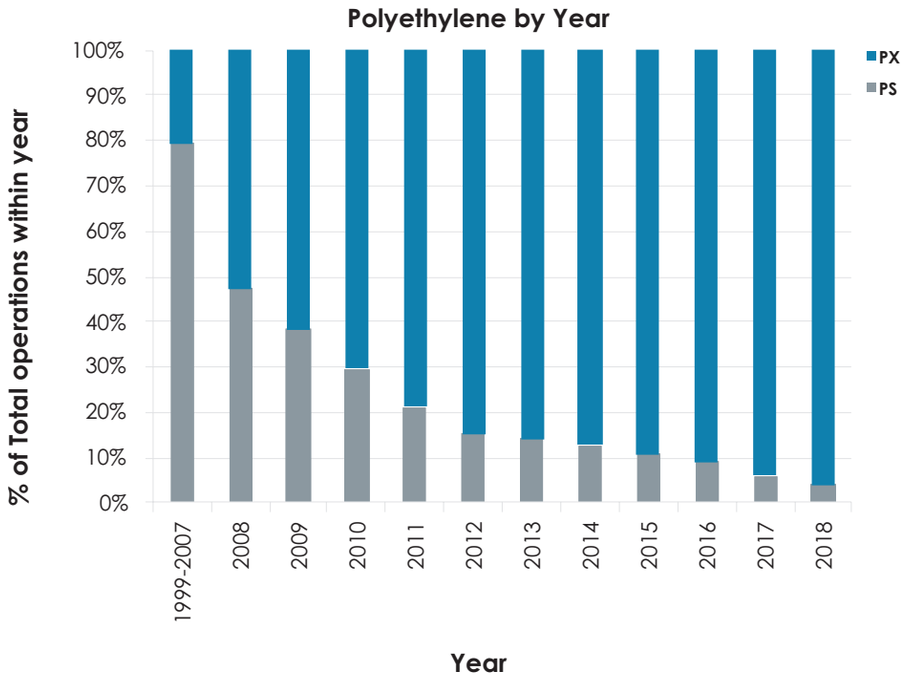
Comparison of different bearing surface usage over time



Comparison of head size usage over time



Comparison usage of standard vs cross linked polyethylene over time



Bone graft

Femoral autograft	238
Femoral allograft	48
Femoral synthetic	9
Acetabular autograft	1,035
Acetabular allograft	129
Acetabular synthetic	6

Cement

Femur cemented	81,923 (60%)
Antibiotic in cement	56,051 (68%
Acetabulum cemented	27,976 (20%)
Antibiotic in cement	17,738 (63%)

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic:	131,825 (96%)

Operating theatre

Conventional	83,480
Laminar flow	51,864
Space suits	40,604

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	16,778	16
2	61,489	59
3	24,314	24
4	796	1

For the fourteen year period 2005 – 2018, there were 103,460 (96%) primary hip procedures with the ASA class recorded.

Operative time (skin to skin)

Average	78 minutes

Surgeon grade

The updated forms introduced in 2005 have separated The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the thirteen year period 2005 – 2018.

Consultant	93,927
Advanced trainee supervised	8,876
Advanced trainee unsupervised	2,847
Basic trainee	1,990

Prosthesis usage

Conventional primary hips

Top 10 femoral components used in 2018

Exeter V40	3,322
Corail	1,582
Accolade II	519
C-Stem AMT	398
Stemsys	302
Polarstem uncemented	297
MS 30	269
CPT	250
Twinsys cemented	247
Twinsys uncemented	245

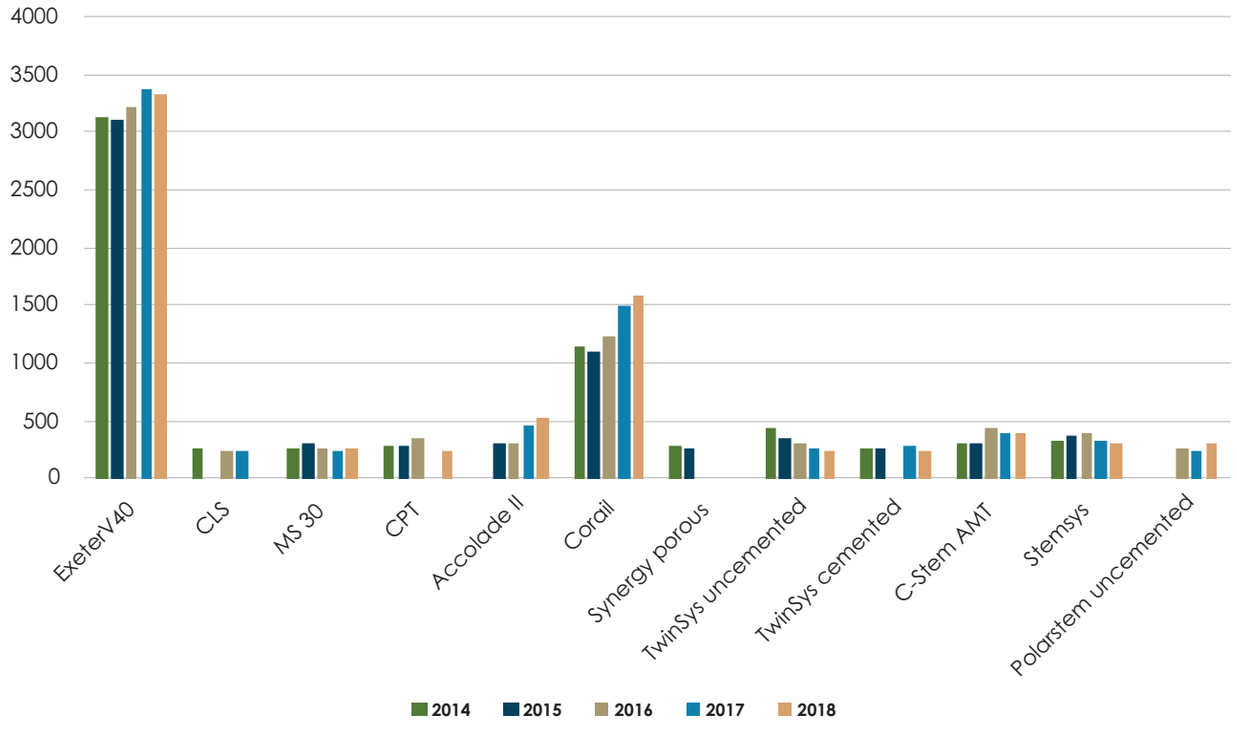
Top 10 acetabular components used in 2018

Pinnacle	2,350
Trident	1,363
RM Pressfit cup	1,024
Continuum TM	820
Tritanium	644
R3 porous	542
Fitmore	402
Exeter X3	338
G7 acetabular shell	277
Trilogy	234

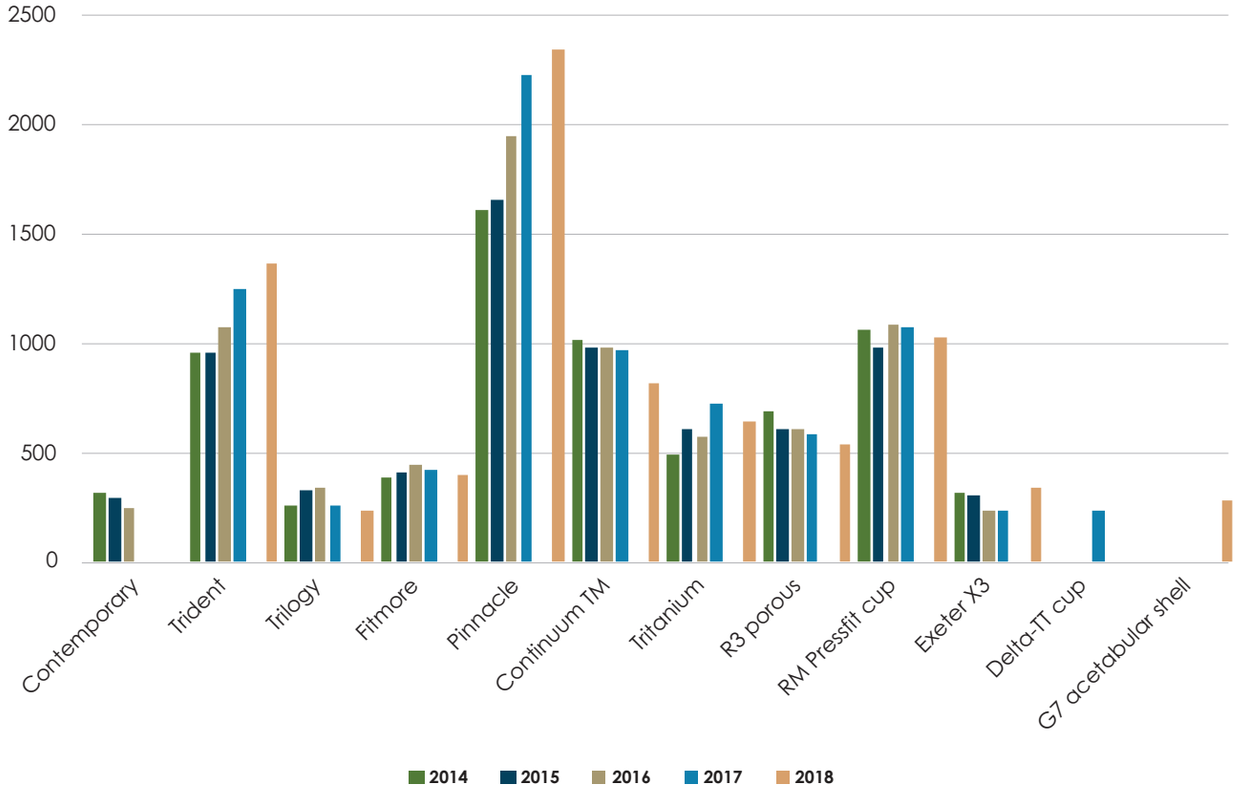
Top ten combinations used in 2018

Femur	Acetabulum	All Years	2018
Corail	Pinnacle	10,351	1,471
Exeter V40	Trident	10,390	1,049
Exeter V40	Tritanium	3,120	418
C-Stem AMT	Pinnacle	2,339	356
Exeter V40	Exeter X3	2,103	336
Exeter V40	RM Pressfit cup	2,385	301
Exeter V40	Pinnacle	2,448	290
Polarstem uncemented	R3 porous	1,517	271
Twinsys uncemented	RM Pressfit cup	4,855	241
Exeter V40	Continuum TM	2,539	236

Most used femoral components per year for five years 2014 – 2018



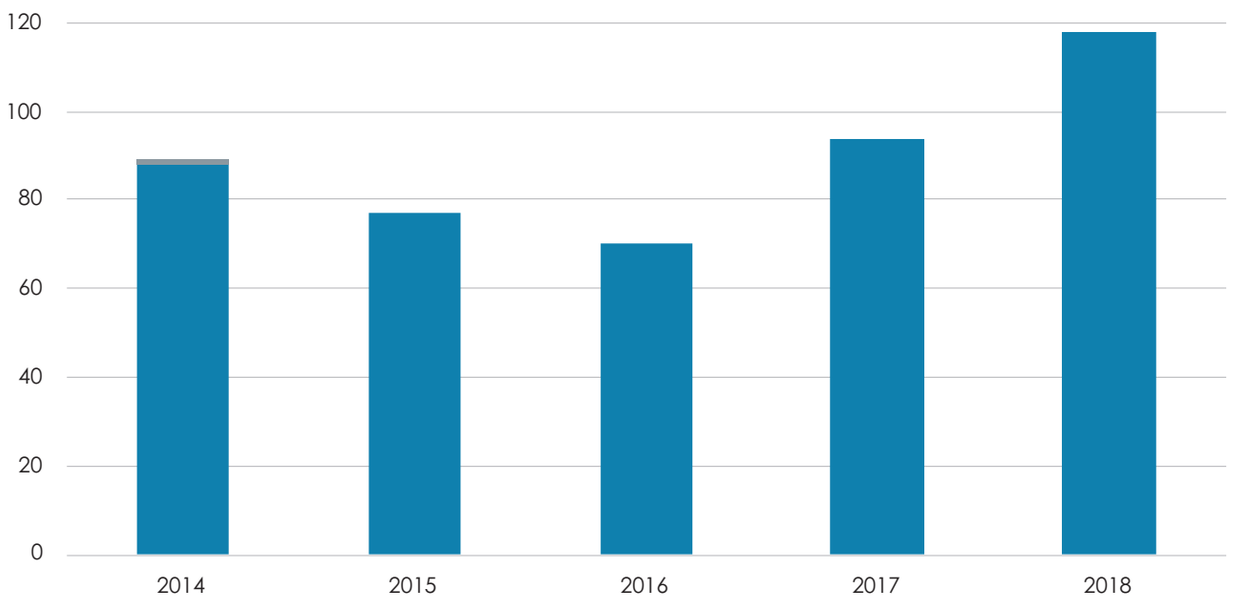
Most used acetabular components per year for five years 2014 – 2018



Resurfacing hips components used in 2018

BHR	118

Resurfacing Components for five years 2014 – 2018



Surgeon and Hospital Workload

Surgeons

In 2018, 236 surgeons performed 9,169 total hip replacements, an average of 39 procedures per surgeon.

Hospitals

In 2018, 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 twenty year period January 1999 – December 2018, there were 19,582 revision hip procedures registered.

The average age for a revision hip replacement was 70 years, with a range of 18–100 years.

Revision hips

	Female	Male
Number	9,465	10,117
Percentage	48.34	51.66
Mean age	70.45	70.01
Maximum age	100.28	99.83
Minimum age	17.52	20.57
Standard dev.	12.02	10.95

The percentage of revision hips to primary hips is 14%.

Body Mass Index

For the 9 year period 2010 – 2018, there were 3,329 BMI registrations for revision hip replacements. The average BMI was 28.98 with a range of 15-55 with a standard deviation of 5.69.

REVISION OF REGISTERED PRIMARY HIP ARTHROPLASTIES

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

There were 6,965 revisions of the 135,461 primary conventional hip replacements (5%) and 150 revisions of the 1,877 resurfacing hip replacements (8%) a total of 7,115 revisions.

Conventional hip arthroplasty analyses

Time to revision for conventional hips

Average	2,137 days
Maximum	7,091 days
Minimum	0 days
Standard deviation	1,828 days

Reason for revision

Reason for revision	
Dislocation	1,489
Loosening acetabular component	1,476
Loosening femoral component	1,169
Pain	1,012
Deep infection	865
Fracture femur	799

Analysis of the six main reasons for revision by year after primary procedure

Years	Dislocation		Loosening Acetabular		Loosening Femoral		Deep infection		Pain		Fracture Femur	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
0	629	42.2	156	10.6	104	8.9	375	43.4	79	7.8	270	33.8
1	171	11.5	79	5.4	85	7.3	102	11.8	102	10.1	48	6.0
2	123	8.3	76	5.1	78	6.7	78	9.0	90	8.9	45	5.6
3	99	6.6	86	5.8	72	6.2	50	5.8	72	7.1	38	4.8
4	63	4.2	69	4.7	68	5.8	39	4.5	68	6.7	54	6.8
5	67	4.5	75	5.1	66	5.6	34	3.9	74	7.3	37	4.6
6	59	4.0	94	6.4	90	7.7	28	3.2	69	6.8	31	3.9
7	44	3.0	85	5.8	86	7.4	26	3.0	56	5.5	38	4.8
8	53	3.6	99	6.7	72	6.2	28	3.2	63	6.2	42	5.3
9	32	2.1	113	7.7	69	5.9	30	3.5	56	5.5	39	4.9
10	29	1.9	82	5.6	88	7.5	19	2.2	51	5.0	36	4.5
>10	120	8.1	462	31.3	291	24.9	56	6.5	232	22.9	121	15.1
Total	**1,489**	**100**	**1,476**	**100**	**1,169**	**100**	**865**	**100**	**1,012**	**100**	**799**	**100**

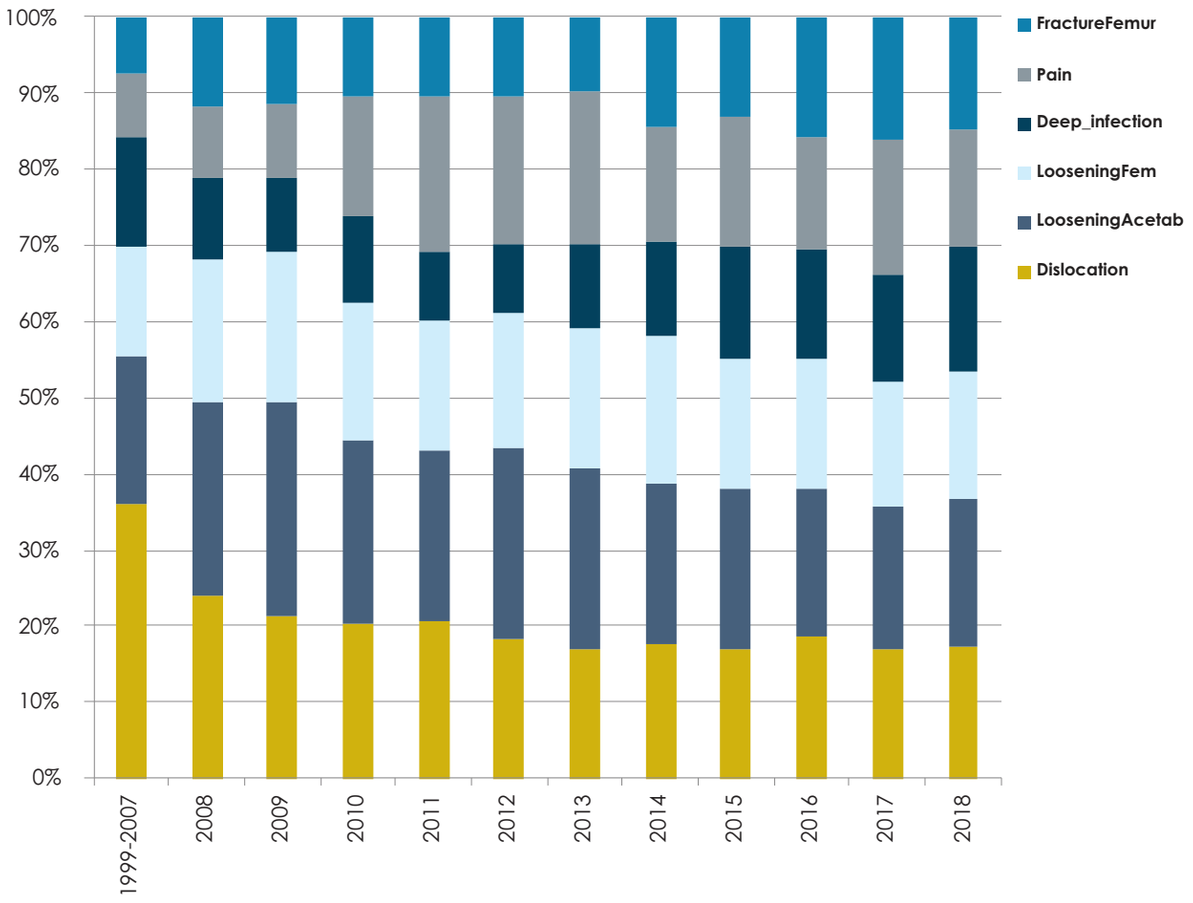
Analyses of numbers of the six main reasons for revision by year

	Dislocation	Loosening Acetabular	Loosening Femoral	Deep infection	Pain	Fracture Femur
	No.	No.	No.	No.	No.	No.
1999-2007	450	239	182	177	106	91
2008	82	88	64	37	33	40
2009	81	108	75	37	38	43
2010	87	104	79	49	67	45
2011	106	116	88	45	106	53
2012	91	126	88	46	97	52
2013	94	130	102	61	110	54
2014	87	104	96	62	74	72
2015	102	125	102	89	101	79
2016	105	110	95	81	83	89
2017	102	110	99	84	106	95
2018	101	114	99	97	91	86

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

	Dislocation	Loosening Acetabular	Loosening Femoral	Deep infection	Pain	Fracture Femur
	%	%	%	%	%	%
1999-2007	37.9	20.1	15.3	14.9	8.9	7.7
2008	24.9	26.7	19.5	11.2	10.0	12.2
2009	22.2	29.6	20.5	10.1	10.4	11.8
2010	21.5	25.7	19.6	12.1	16.6	11.1
2011	20.7	22.6	17.2	8.8	20.7	10.3
2012	17.3	23.9	16.7	8.7	18.4	9.9
2013	15.9	21.9	17.2	10.3	18.5	9.1
2014	15.6	18.6	17.2	11.1	13.2	12.9
2015	16.4	20.1	16.4	14.3	16.3	12.7
2016	17.0	17.8	15.4	13.1	13.4	14.4
2017	16.6	17.9	16.2	13.2	17.3	15.5
2018	16.1	18.1	15.7	15.4	14.5	13.7

Comparison of the 6 main reasons for revision over time



RESURFACED HIP ANALYSES

There were 1,877 resurfacing hips registered for the period 2000 – 2018, and 150 (8%) have been revised.

Time to revision for resurfaced hips

Average	2,016 days
Maximum	4,430 days
Minimum	10 days
Standard deviation	1,157 days

Reason for revision

Pain	48
Loosening acetabulum	17
Deep infection	17
Loosening femoral component	16
Fracture femur	15
Dislocation	2

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

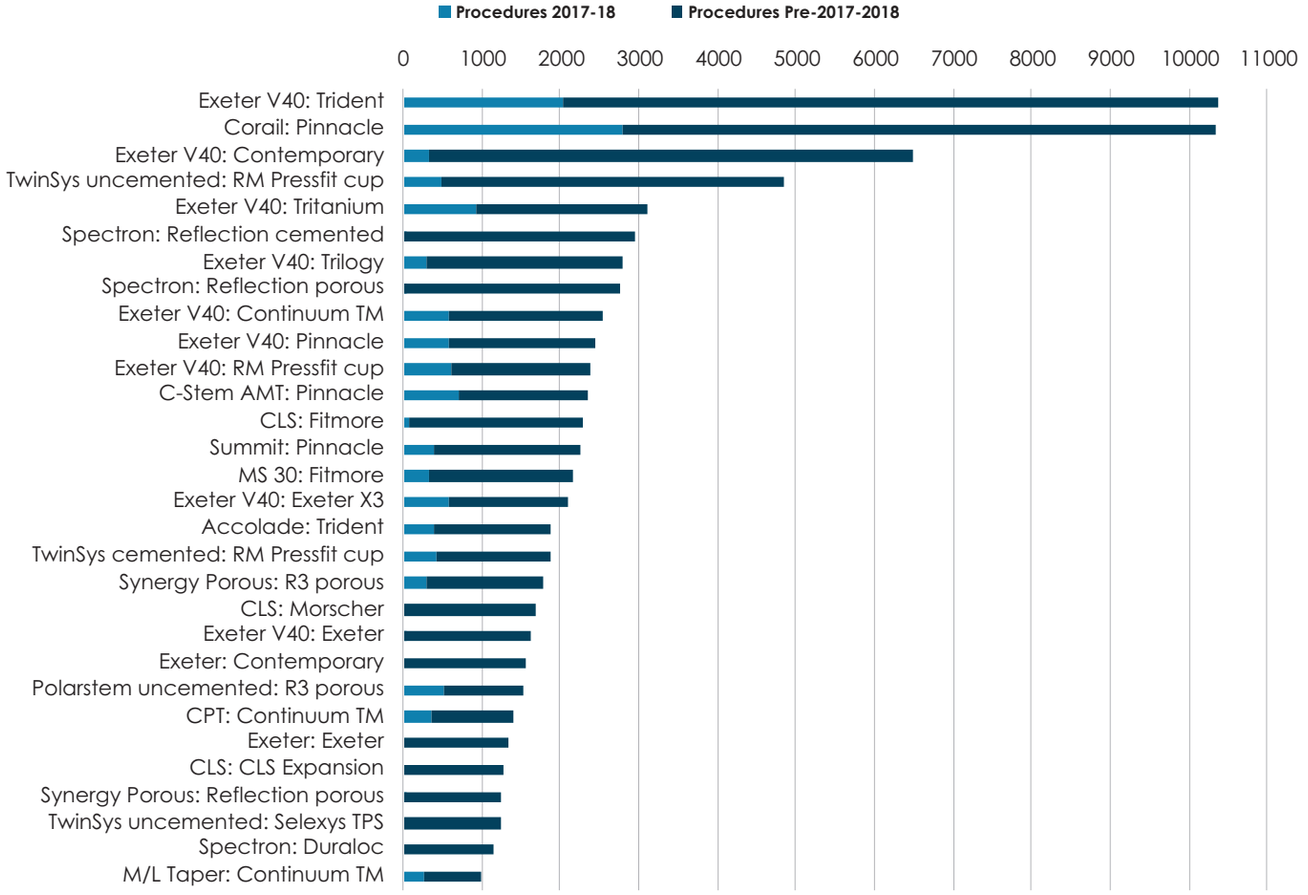
Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CI's) but sometimes significance can apply in the presence of CI overlap.

Conventional Primary Hip Arthroplasties

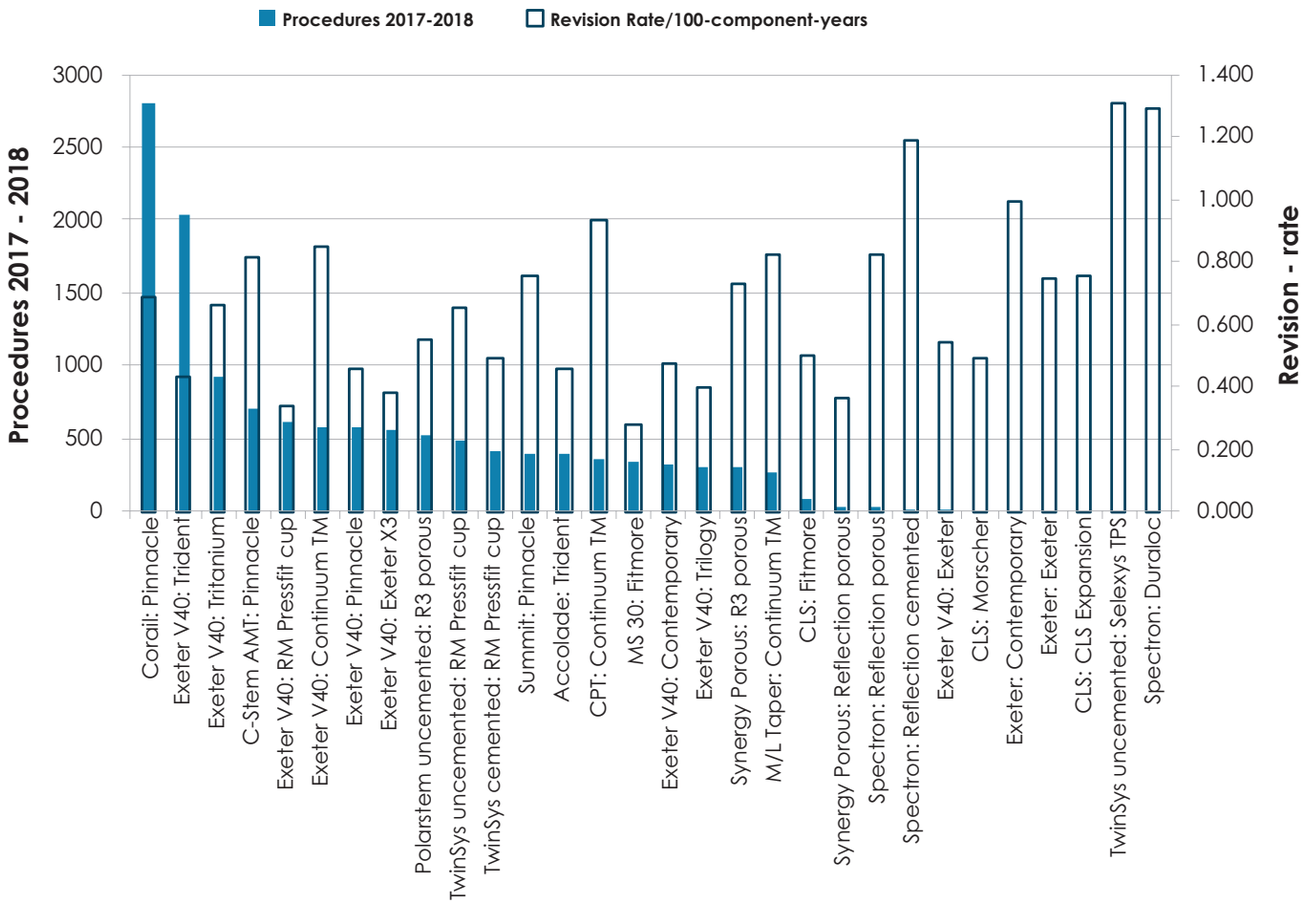
All Primary Total Hip Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% Confidence Interval	
135,461	972,138	6,965	0.72	0.70	0.73

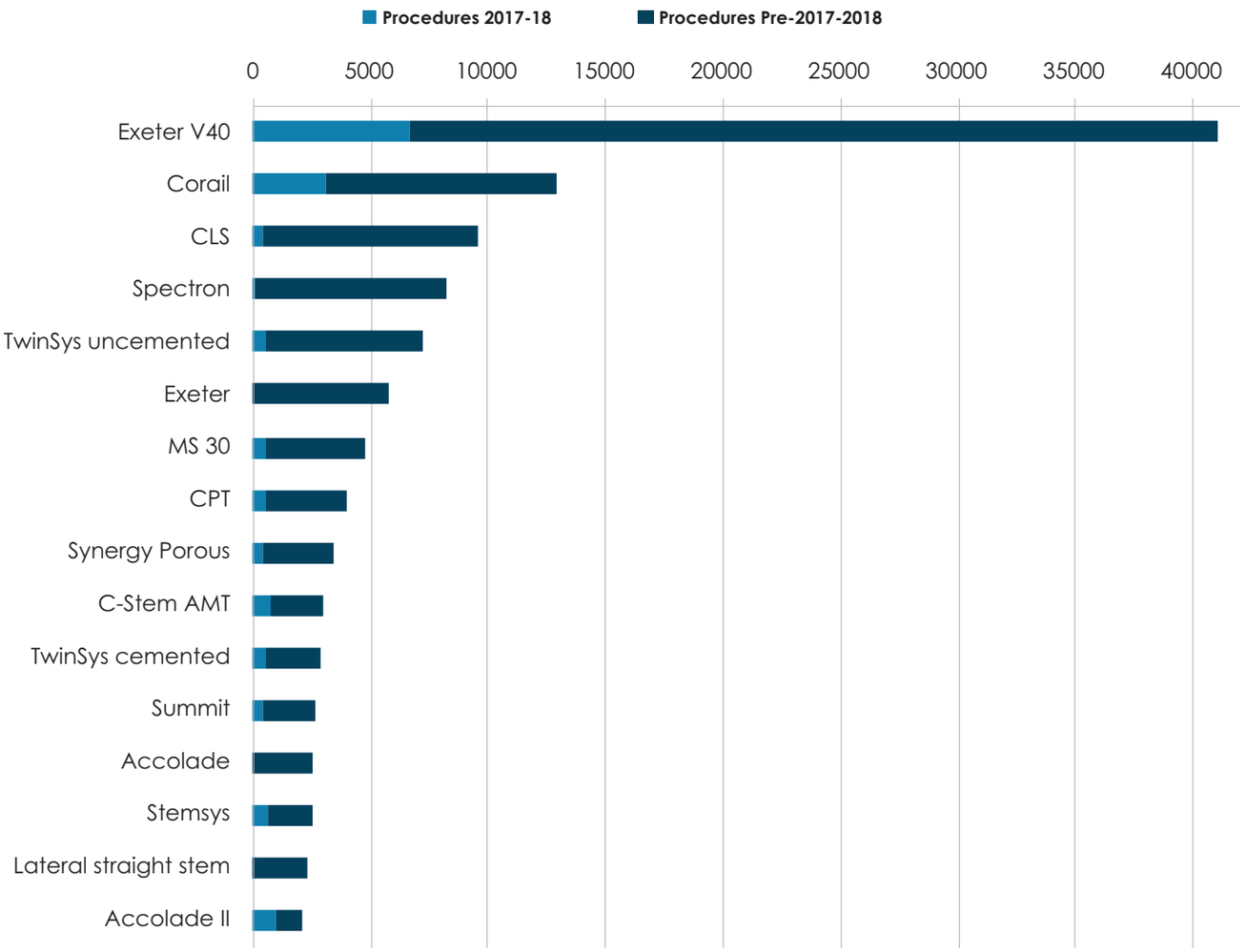
The figure below summarises the 30 Hip prostheses combinations with >1000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.



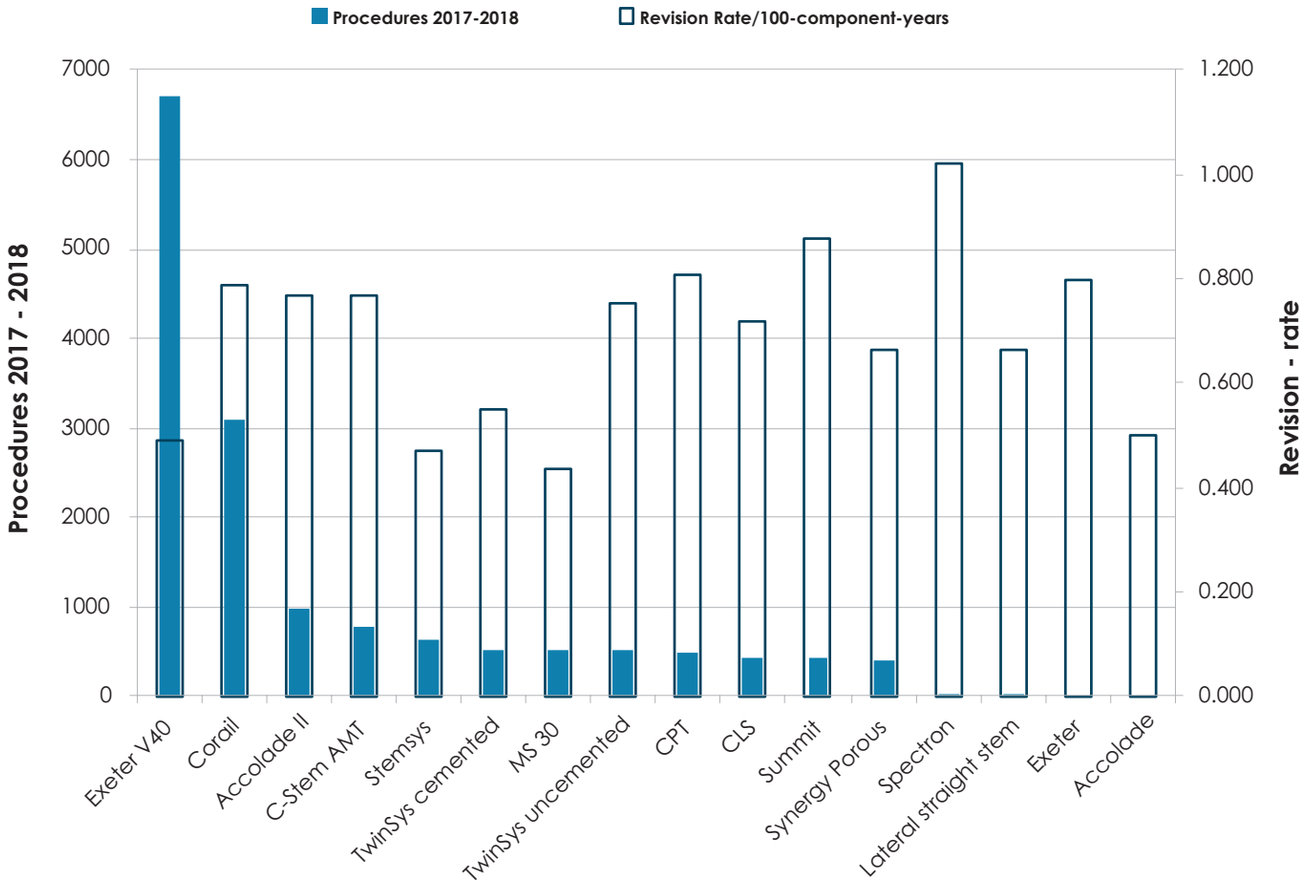
The figure below summarises the 30 Hip prostheses combinations with >1000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



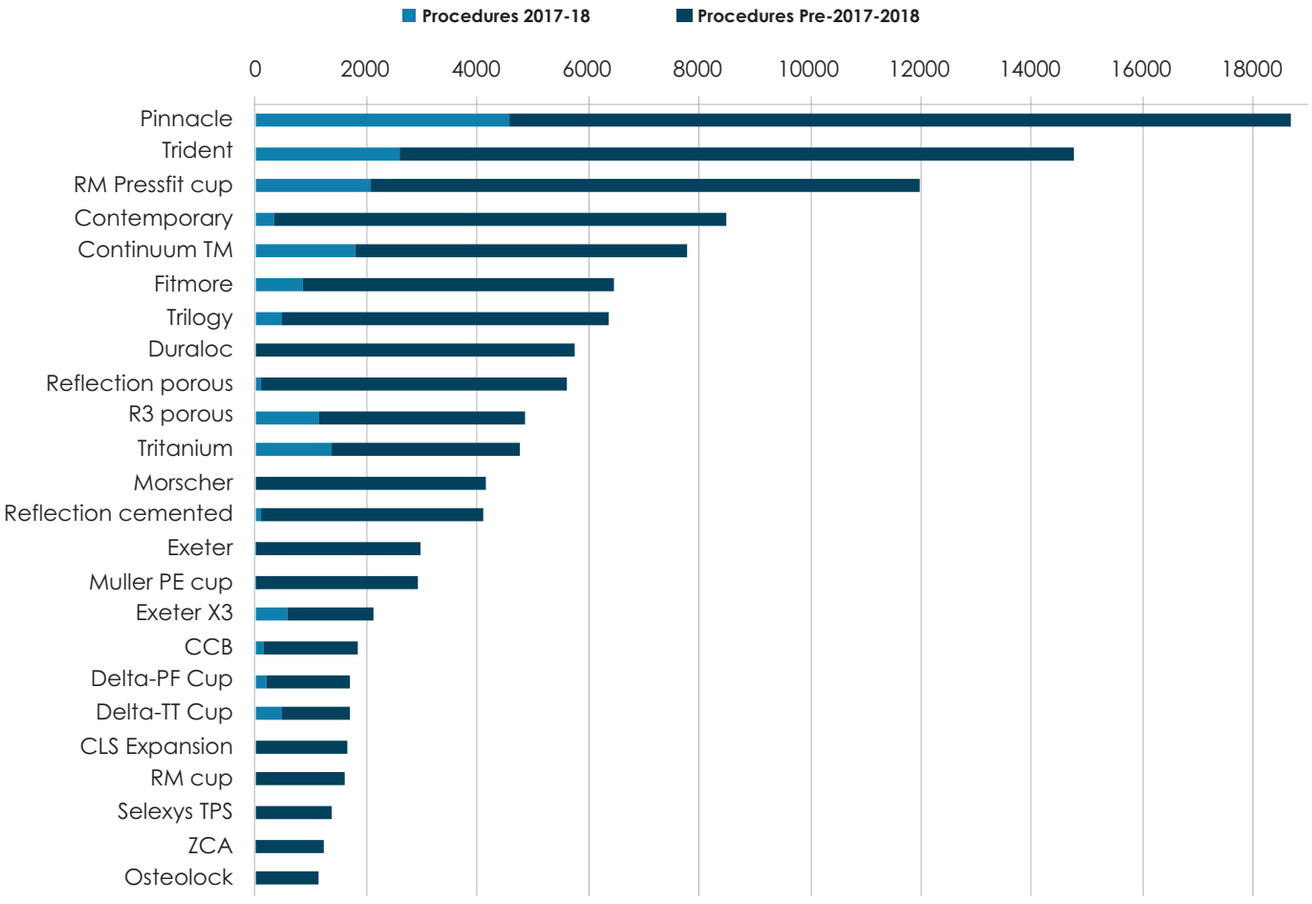
The figure below summarises the 16 Hip femur prostheses with >2000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.



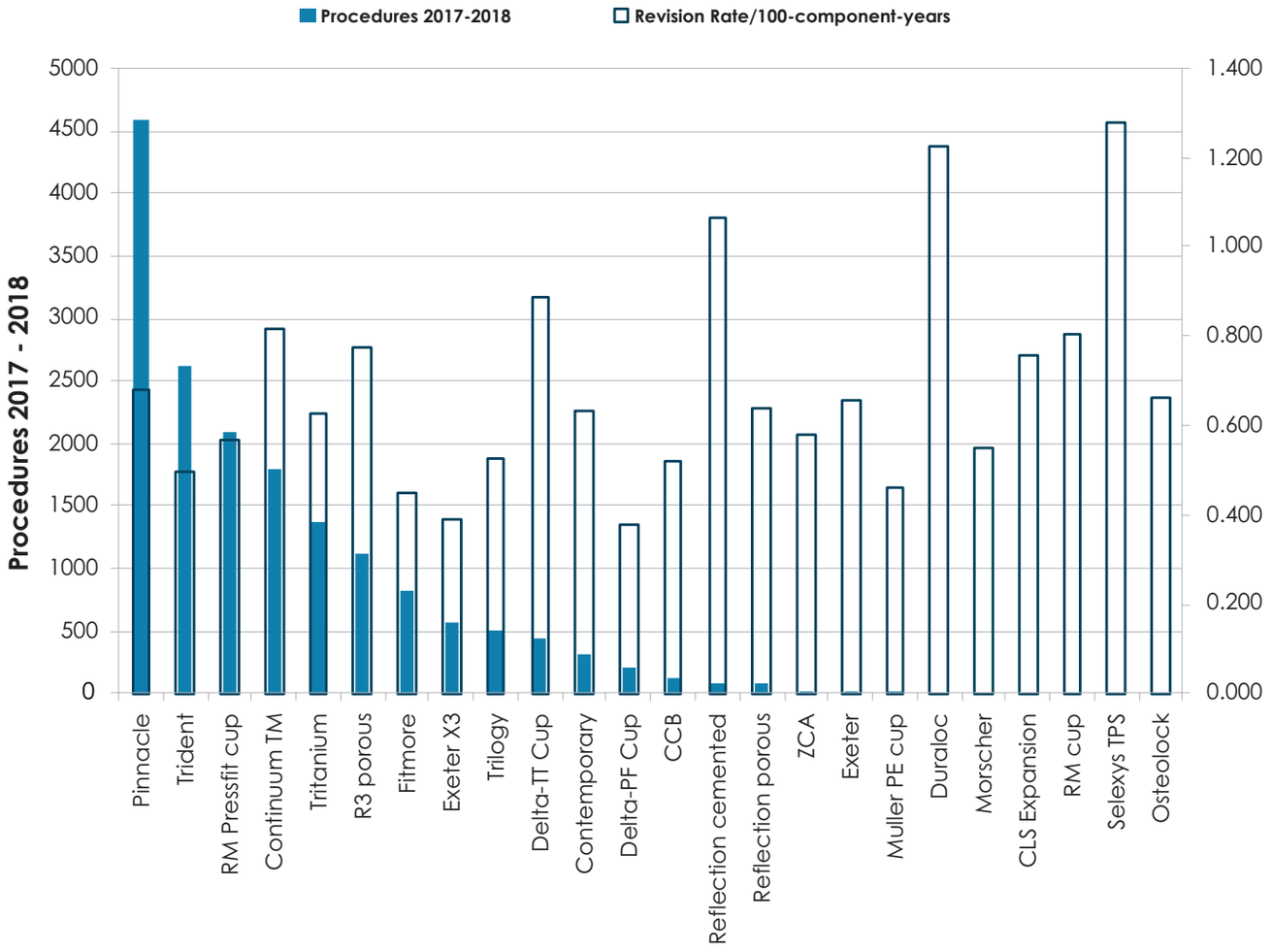
The figure below summarises the 16 Hip femur prostheses with >2000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



The figure below summarises the 24 Hip acetabular prostheses with >1000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.



The figure below summarises the 24 Hip acetabular prostheses with >1000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Anthology Porous	R3 porous	68	486.2	32	6.58	4.42	9.17	1
MasterSL	Delta-TT Cup	59	52.6	2	3.81	0.46	13.75	36
CPT	G7 acetabular shell	58	95.0	3	3.16	0.65	9.23	26
Taperloc Complete	Continuum TM	108	101.1	3	2.97	0.61	8.67	63
ABGII	RM Pressfit cup	81	218.5	6	2.75	1.01	5.98	12
Twinsys cemented	Pinnacle	76	286.1	7	2.45	0.98	5.04	8
Accolade II	RM Pressfit cup	79	126.2	3	2.38	0.49	6.95	27
Taperloc Complete	RM Pressfit cup	168	266.9	5	1.87	0.61	4.37	44
CPT	Delta-TT Cup	79	182.5	3	1.64	0.34	4.80	18
Echo Bi-Metric	Continuum TM	106	183.8	3	1.63	0.34	4.77	26
C-Stem	Pinnacle	77	260.2	4	1.54	0.42	3.94	12
Taperloc Complete	G7 acetabular shell	259	390.5	6	1.54	0.56	3.34	96
H-Max C	Delta-TT Cup	61	134.1	2	1.49	0.18	5.39	21
Exeter V40	G7 acetabular shell	112	212.7	3	1.41	0.29	4.12	39
Friendly	Delta-TT Cup	67	410.6	5	1.22	0.40	2.84	1
Exeter V40	Trabecular Metal Shell	211	1079.1	13	1.20	0.64	2.06	14
Spectron	Reflection cemented	2956	29,689.6	353	1.19	1.07	1.32	2
H-Max S	Delta-PF Cup	194	591.6	7	1.18	0.42	2.32	10
Stemsys	Polymax	119	254.4	3	1.18	0.24	3.45	20
Avenir Muller uncemented	Continuum TM	179	1,074.6	11	1.02	0.51	1.83	1
Corail	RM Pressfit cup	144	504.8	5	0.99	0.32	2.31	7
S-Rom	Pinnacle	375	3,633.1	35	0.96	0.66	1.32	8
CPT	Fitmore	191	1,053.9	10	0.95	0.46	1.75	10
CPT	Continuum TM	1387	4,915.7	46	0.94	0.69	1.25	191
Stemsys	Agilis Ti-por	439	1,501.4	14	0.93	0.49	1.52	46
H-Max S	Delta-TT Cup	737	2,937.5	27	0.92	0.59	1.32	48
CPT	Trilogy	843	6,459.6	56	0.87	0.65	1.13	1
C-Stem AMT	RM Pressfit cup	129	467.7	4	0.86	0.23	2.19	23
Exeter V40	Continuum TM	2539	10,125.6	86	0.85	0.68	1.05	236
Trabecular Metal Stem	Continuum TM	447	2,151.9	18	0.84	0.50	1.32	10
CLS	Tritanium	80	362.3	3	0.83	0.17	2.42	4
M/L Taper	Continuum TM	1004	4,120.2	34	0.83	0.57	1.15	123
C-Stem AMT	Pinnacle	2339	8,132.8	66	0.81	0.62	1.03	356
Accolade II	Delta-TT Cup	72	125.6	1	0.80	0.02	4.43	18
Corail	Fitmore	285	893.5	7	0.78	0.31	1.61	17
CBC	RM Pressfit cup	444	2,688.8	21	0.78	0.48	1.19	12
CLS	Continuum TM	719	2,920.8	22	0.75	0.47	1.14	75
Summit	Pinnacle	2248	1,3418.1	101	0.75	0.61	0.91	185

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Accolade II	Trident	858	2,158.4	16	0.74	0.42	1.20	219
Synergy Porous	R3 porous	1779	7,919.5	58	0.73	0.56	0.95	126
Corail	Continuum TM	304	1,099.0	8	0.73	0.31	1.43	35
Optimys	RM Pressfit cup	106	140.0	1	0.71	0.02	3.98	46
CLS	Trabecular Metal Shell	53	420.1	3	0.71	0.15	2.09	2
Echo Bi-Metric	G7 acetabular shell	320	722.1	5	0.69	0.22	1.62	95
Exeter V40	R3 porous	605	2,186.6	15	0.69	0.38	1.13	70
Corail	Pinnacle	10351	48,382.9	331	0.68	0.61	0.76	1,471
CPCS	R3 porous	326	889.9	6	0.67	0.21	1.39	63
CLS	Reflection porous	373	2,990.9	20	0.67	0.41	1.03	15
M/L Taper	Trident	249	748.4	5	0.67	0.22	1.56	52
Exeter V40	Tritanium	3120	11,169.7	74	0.66	0.52	0.83	418
CLS	RM Pressfit cup	567	3,853.8	25	0.65	0.42	0.96	27
Twinsys uncemented	RM Pressfit cup	4855	29,448.8	191	0.65	0.56	0.75	241
Exeter V40	Delta-TT Cup	223	771.1	5	0.65	0.21	1.51	34
Twinsys cemented	CCB	441	2,331.4	15	0.64	0.36	1.06	14
CPT	ZCA	545	5,487.9	35	0.64	0.44	0.89	2
Avenir Muller uncemented	RM Pressfit cup	51	158.0	1	0.63	0.02	3.53	2
Corail	Trident	88	480.8	3	0.62	0.13	1.82	8
CLS	Trilogy	596	4,236.2	25	0.59	0.38	0.87	24
Accolade II	Tritanium	935	2,381.4	14	0.59	0.32	0.99	200
C-Stem AMT	Marathon cemented	330	1,763.1	10	0.57	0.27	1.04	14
Polarstem uncemented	R3 porous	1517	4,554.6	25	0.55	0.36	0.81	271
Exeter V40	Exeter	1639	15,405.7	84	0.55	0.43	0.68	1
Lateral straight stem	Muller PE cup	750	7,185.8	39	0.54	0.39	0.74	1
Stemsys	Fixa Ti Por	707	2,700.6	14	0.52	0.27	0.85	77
CCA	CCB	769	6,078.6	31	0.51	0.34	0.71	4
Avenir Muller uncemented	Fitmore	65	196.3	1	0.51	0.01	2.84	27
Wagner cone stem	Fitmore	73	803.3	4	0.50	0.14	1.27	1
CLS	Fitmore	2300	23,622.5	117	0.50	0.41	0.59	34
Twinsys cemented	RM Pressfit cup	1864	8,557.7	42	0.49	0.35	0.66	197
Corail	Tritanium	168	822.6	4	0.49	0.13	1.24	15
M/L Taper	Trilogy	215	1,853.2	9	0.49	0.20	0.89	3
Exeter V40	Contemporary	6504	49,605.6	235	0.47	0.42	0.54	114
Summit	Trilogy	168	1,286.5	6	0.47	0.17	1.02	11
Exeter V40	Pinnacle	2448	11,707.0	53	0.45	0.34	0.59	290

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
MS 30	Continuum TM	404	1,595.9	7	0.44	0.16	0.86	33
Exeter V40	CCB	567	3,018.0	13	0.43	0.23	0.74	33
Exeter V40	Trident	10390	63,631.7	274	0.43	0.38	0.48	1049
Stemsys	RM Pressfit cup	325	1,189.5	5	0.42	0.14	0.98	38
Exeter V40	Reflection cemented	926	5,623.2	23	0.41	0.26	0.61	35
Exeter V40	Trilogy	2805	19,700.1	78	0.40	0.31	0.49	149
Exeter V40	Exeter X3	2103	7,355.7	28	0.38	0.25	0.54	336
Standard straight stem	Muller PE cup	629	5,764.2	21	0.36	0.22	0.55	1
Synergy Porous	Reflection porous	1238	11,875.0	43	0.36	0.26	0.48	14
Exeter V40	RM Pressfit cup	2385	10,968.5	37	0.34	0.23	0.46	301
CLS	Pinnacle	90	614.1	2	0.33	0.04	1.18	10
Corail	Trilogy	207	953.4	3	0.31	0.06	0.92	17
Spectron	R3 porous	432	2,439.2	7	0.29	0.10	0.56	11
MS 30	Fitmore	2174	14,197.5	39	0.27	0.20	0.38	192
Stemsys	DeltaMotion Cup	485	2,413.5	6	0.25	0.08	0.51	44
Twinsys cemented	Continuum TM	108	408.7	1	0.24	0.01	1.36	6
MS 30	Trilogy	331	1,958.0	4	0.20	0.06	0.52	19
Exeter V40	ZCA	93	574.3	1	0.17	0.00	0.97	8
Exeter V40	Fitmore	963	4,733.5	8	0.17	0.07	0.33	91
Stemsys	Delta-PF Cup	396	1,077.1	1	0.09	0.00	0.43	74
Exeter V40	Polymax	63	61.3	0	0.00	0.00	6.02	35
Stemsys cemented	RM Pressfit cup	64	142.1	0	0.00	0.00	2.60	18
C-Stem	Marathon cemented	89	310.1	0	0.00	0.00	1.19	14
Twinsys cemented	Reflection porous	59	174.7	0	0.00	0.00	2.11	9
Synergy Porous	Continuum TM	55	120.5	0	0.00	0.00	3.06	6
Exeter V40	ZCA all-poly cup	104	432.0	0	0.00	0.00	0.85	4

Revision 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		Procedures 2018
S-Rom	ASR	130	801.1	94	11.73	9.43	14.29	0
Coral	ASR	156	1,199.7	83	6.92	5.51	8.58	0
Anthology Porous	BHR Acetabular Cup	93	726.3	50	6.88	5.11	9.08	0
Anthology Porous	R3 porous	68	486.2	32	6.58	4.42	9.17	1
Summit	ASR	88	741.0	36	4.86	3.40	6.73	0
Synergy Porous	BHR Acetabular Cup	114	1,034.2	40	3.87	2.76	5.27	0
MasterSL	Delta-TT Cup	59	52.6	2	3.81	0.46	13.75	36
CLS	Artek	59	712.1	25	3.51	2.22	5.10	0
CLS	Durom	198	1,950.2	63	3.23	2.48	4.13	0
CPT	G7 acetabular shell	58	95.0	3	3.16	0.65	9.23	26
Taperloc Complete	Continuum TM	108	101.1	3	2.97	0.61	8.67	63
ABGII	RM Pressfit cup	81	218.5	6	2.75	1.01	5.98	12
Twinsys cemented	Pinnacle	76	286.1	7	2.45	0.98	5.04	8
Accolade II	RM Pressfit cup	79	126.2	3	2.38	0.49	6.95	27
Lateral straight stem	Trilogy	69	555.6	12	2.16	1.12	3.77	0
ABGII	Duraloc	139	1,929.9	40	2.07	1.46	2.79	0
ABG	Duraloc	116	1,860.4	38	2.04	1.42	2.77	0
Taperloc Complete	RM Pressfit cup	168	266.9	5	1.87	0.61	4.37	44
CPT	Delta-TT Cup	79	182.5	3	1.64	0.34	4.80	18
Echo Bi-Metric	Continuum TM	106	183.8	3	1.63	0.34	4.77	26
Elite plus	Duraloc	608	7,022.0	112	1.59	1.31	1.92	0
Prodigy	Duraloc	113	1,479.9	23	1.55	0.99	2.33	0
M/L Taper	Delta-TT Cup	64	323.4	5	1.55	0.50	3.61	0
C-Stem	Pinnacle	77	260.2	4	1.54	0.42	3.94	12
Taperloc Complete	G7 acetabular shell	259	390.5	6	1.54	0.56	3.34	96
H-Max C	Delta-TT Cup	61	134.1	2	1.49	0.18	5.39	21
ABG	ABGII	72	1,098.6	16	1.46	0.83	2.37	0
CLS	RM cup	113	1,173.0	17	1.45	0.81	2.27	0
Exeter	Duraloc	553	7,808.0	113	1.45	1.19	1.74	0
Exeter V40	G7 acetabular shell	112	212.7	3	1.41	0.29	4.12	39
CBC	Expansys shell	183	1,791.9	25	1.40	0.90	2.06	0
Contemporary	Contemporary	71	912.4	12	1.32	0.68	2.30	0
CCA	Contemporary	74	762.2	10	1.31	0.63	2.41	0
H-Max M	Delta-PF Cup	71	535.0	7	1.31	0.47	2.57	0
Twinsys uncemented	Selexys TPS	1231	10,413.9	136	1.31	1.10	1.54	0
Spectron	Duraloc	1151	13,752.9	177	1.29	1.10	1.49	0
Friendly	Delta-TT Cup	67	410.6	5	1.22	0.40	2.84	1

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Spectron	Muller PE cup	66	658.5	8	1.21	0.52	2.39	0
Mallory-Head	M2A	105	1,237.7	15	1.21	0.68	2.00	0
Exeter V40	Trabecular Metal Shell	211	1,079.1	13	1.20	0.64	2.06	14
Spectron	Reflection cemented	2956	29,689.6	353	1.19	1.07	1.32	2
H-Max S	Delta-PF Cup	194	591.6	7	1.18	0.42	2.32	10
Stemsys	Polymax	119	254.4	3	1.18	0.24	3.45	20
S-Rom	Ultima	78	1,250.4	14	1.12	0.61	1.88	0
Spectron	Morscher	210	2,769.6	31	1.12	0.76	1.59	0
Twinsys cemented	Selexys TPS	65	458.4	5	1.09	0.35	2.55	0
AML MMA	Duraloc	74	1,034.3	11	1.06	0.50	1.84	0
CLS	Allofit	192	1,924.0	20	1.04	0.61	1.57	0
Avenir Muller uncemented	Continuum TM	179	1,074.6	11	1.02	0.51	1.83	1
CLS	Duraloc	699	9,128.1	91	1.00	0.80	1.22	0
Exeter	Contemporary	1551	18,301.8	182	0.99	0.85	1.15	0
Corail	RM Pressfit cup	144	504.8	5	0.99	0.32	2.31	7
CPT	Tritanium	85	611.2	6	0.98	0.36	2.14	0
S-Rom	Pinnacle	375	3,633.1	35	0.96	0.66	1.32	8
Corail	Duraloc	464	5,139.0	49	0.95	0.71	1.26	0
CPT	Fitmore	191	1,053.9	10	0.95	0.46	1.75	10
C-Stem	Duraloc	53	634.1	6	0.95	0.35	2.06	0
CPT	Continuum TM	1387	4,915.7	46	0.94	0.69	1.25	191
Stemsys	Agilis Ti-por	439	1,501.4	14	0.93	0.49	1.52	46
Exeter V40	Duraloc	987	10,786.5	100	0.93	0.75	1.12	0
H-Max S	Delta-TT Cup	737	2,937.5	27	0.92	0.59	1.32	48
AML	Duraloc	53	780.7	7	0.90	0.36	1.85	0
SL modular stem	RM cup	322	4,578.4	40	0.87	0.62	1.19	0
Twinsys uncemented	RM cup	122	1,036.2	9	0.87	0.40	1.65	0
CPT	Trilogy	843	6,459.6	56	0.87	0.65	1.13	1
ABGII	Delta-PF Cup	107	1,273.7	11	0.86	0.40	1.49	0
C-Stem AMT	RM Pressfit cup	129	467.7	4	0.86	0.23	2.19	23
CPT	Monoblock Acetabular Cup	84	937.6	8	0.85	0.33	1.61	0
Exeter V40	Continuum TM	2539	10,125.6	86	0.85	0.68	1.05	236
ABGII	Trident	342	4,038.1	34	0.84	0.58	1.18	0
CBC	Fitmore	59	597.2	5	0.84	0.27	1.95	0
Trabecular Metal Stem	Continuum TM	447	2,151.9	18	0.84	0.50	1.32	10
CLS	Tritanium	80	362.3	3	0.83	0.17	2.42	4
M/L Taper	Continuum TM	1004	4,120.2	34	0.83	0.57	1.15	123

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Corail	Pinnacle	10351	48,382.9	331	0.68	0.61	0.76	1471
Polarstem uncemented	Reflection porous	335	2,072.2	14	0.68	0.37	1.13	0
Exeter	Osteolock	836	11,108.7	75	0.68	0.53	0.85	0
CPCS	R3 porous	326	889.9	6	0.67	0.21	1.39	63
CLS	Reflection porous	373	2,990.9	20	0.67	0.41	1.03	15
M/L Taper	Trident	249	748.4	5	0.67	0.22	1.56	52
Exeter V40	Tritanium	3120	11,169.7	74	0.66	0.52	0.83	418
CLS	RM Pressfit cup	567	3,853.8	25	0.65	0.42	0.96	27
Twinsys uncemented	RM Pressfit cup	4855	29,448.8	191	0.65	0.56	0.75	241
Exeter V40	Delta-TT Cup	223	771.1	5	0.65	0.21	1.51	34
CPT	Duraloc	212	2,467.9	16	0.65	0.37	1.05	0
Twinsys cemented	CCB	441	2,331.4	15	0.64	0.36	1.06	14
CPT	ZCA	545	5,487.9	35	0.64	0.44	0.89	2
Exeter	CLS Expansion	129	1,578.9	10	0.63	0.30	1.16	0
Avenir Muller uncemented	RM Pressfit cup	51	158.0	1	0.63	0.02	3.53	2
Elite plus	Charnley	298	3,661.5	23	0.63	0.40	0.94	0
MS 30	Morscher	787	9,737.6	61	0.63	0.48	0.80	0
CLS	Weill ring	106	1,601.3	10	0.62	0.28	1.11	0
Corail	Trident	88	480.8	3	0.62	0.13	1.82	8
Versys cemented	ZCA	391	4200.1	26	0.62	0.40	0.91	0
Twinsys uncemented	Continuum TM	133	821.0	5	0.61	0.20	1.42	0
Twinsys uncemented	Trilogy	209	1,811.8	11	0.61	0.30	1.09	0
CLS	Trilogy	596	4,236.2	25	0.59	0.38	0.87	24
Accolade II	Tritanium	935	2,381.4	14	0.59	0.32	0.99	200
Accolade	Muller PE cup	114	1,206.7	7	0.58	0.21	1.14	0
C-Stem AMT	Marathon cemented	330	1,763.1	10	0.57	0.27	1.04	14
Spectron	Trident	78	886.1	5	0.56	0.15	1.24	0
Exeter	Bio-clad poly	113	1,254.7	7	0.56	0.22	1.15	0
Elite plus	Elite Plus Ogee	110	1,084.5	6	0.55	0.20	1.20	0
Polarstem uncemented	R3 porous	1517	4,554.6	25	0.55	0.36	0.81	271
Exeter V40	Exeter	1639	15,405.7	84	0.55	0.43	0.68	1
Lateral straight stem	Muller PE cup	750	7,185.8	39	0.54	0.39	0.74	1
Corail	Monoblock Acetabular Cup	95	941.1	5	0.53	0.17	1.24	0
Stemsys	Fixa Ti Por	707	2,700.6	14	0.52	0.27	0.85	77
MS 30	RM Pressfit cup	90	774.5	4	0.52	0.14	1.32	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Spectron	Fitmore	78	978.2	5	0.51	0.14	1.12	0
CCA	CCB	769	6,078.6	31	0.51	0.34	0.71	4
Avenir Muller uncemented	Fitmore	65	196.3	1	0.51	0.01	2.84	27
Wagner cone stem	Fitmore	73	803.3	4	0.50	0.14	1.27	1
CLS	Fitmore	2300	23,622.5	117	0.50	0.41	0.59	t34
Corail	Pinnacle	10351	48,382.9	331	0.68	0.61	0.76	1471
Polarstem uncemented	Reflection porous	335	2,072.2	14	0.68	0.37	1.13	0
Exeter	Osteolock	836	11,108.7	75	0.68	0.53	0.85	0
CPCS	R3 porous	326	889.9	6	0.67	0.21	1.39	63
CLS	Reflection porous	373	2,990.9	20	0.67	0.41	1.03	15
M/L Taper	Trident	249	748.4	5	0.67	0.22	1.56	52
Exeter V40	Tritanium	3120	11,169.7	74	0.66	0.52	0.83	418
CLS	RM Pressfit cup	567	3,853.8	25	0.65	0.42	0.96	27
Twinsys uncemented	RM Pressfit cup	4855	29,448.8	191	0.65	0.56	0.75	241
Exeter V40	Delta-TT Cup	223	771.1	5	0.65	0.21	1.51	34
CPT	Duraloc	212	2,467.9	16	0.65	0.37	1.05	0
Twinsys cemented	CCB	441	2,331.4	15	0.64	0.36	1.06	14
CPT	ZCA	545	5,487.9	35	0.64	0.44	0.89	2
Exeter	CLS Expansion	129	1,578.9	10	0.63	0.30	1.16	0
Avenir Muller uncemented	RM Pressfit cup	51	158.0	1	0.63	0.02	3.53	2
Elite plus	Charnley	298	3,661.5	23	0.63	0.40	0.94	0
MS 30	Morscher	787	9,737.6	61	0.63	0.48	0.80	0
CLS	Weill ring	106	1,601.3	10	0.62	0.28	1.11	0
Corail	Trident	88	480.8	3	0.62	0.13	1.82	8
Versys cemented	ZCA	391	4200.1	26	0.62	0.40	0.91	0
Twinsys uncemented	Continuum TM	133	821.0	5	0.61	0.20	1.42	0
Twinsys uncemented	Trilogy	209	1,811.8	11	0.61	0.30	1.09	0
CLS	Trilogy	596	4,236.2	25	0.59	0.38	0.87	24
Accolade II	Tritanium	935	2,381.4	14	0.59	0.32	0.99	200
Accolade	Muller PE cup	114	1,206.7	7	0.58	0.21	1.14	0
C-Stem AMT	Marathon cemented	330	1,763.1	10	0.57	0.27	1.04	14
Spectron	Trident	78	886.1	5	0.56	0.15	1.24	0
Exeter	Bio-clad poly	113	1,254.7	7	0.56	0.22	1.15	0
Elite plus	Elite Plus Ogee	110	1,084.5	6	0.55	0.20	1.20	0
Polarstem uncemented	R3 porous	1517	4,554.6	25	0.55	0.36	0.81	271
Exeter V40	Exeter	1639	15,405.7	84	0.55	0.43	0.68	1

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Lateral straight stem	Muller PE cup	750	7,185.8	39	0.54	0.39	0.74	1
Corail	Monoblock Acetabular Cup	95	941.1	5	0.53	0.17	1.24	0
Stemsys	Fixa Ti Por	707	2,700.6	14	0.52	0.27	0.85	77
MS 30	RM Pressfit cup	90	774.5	4	0.52	0.14	1.32	0
Spectron	Fitmore	78	978.2	5	0.51	0.14	1.12	0
CCA	CCB	769	6,078.6	31	0.51	0.34	0.71	4
Avenir Muller uncemented	Fitmore	65	196.3	1	0.51	0.01	2.84	27
Wagner cone stem	Fitmore	73	803.3	4	0.50	0.14	1.27	1
CLS	Fitmore	2300	23,622.5	117	0.50	0.41	0.59	34
CLS	Morscher	1682	22,801.5	112	0.49	0.40	0.59	0
Twinsys cemented	RM Pressfit cup	1864	8,557.7	42	0.49	0.35	0.66	197
Spectron	Biomex acet shell porous	68	1,023.2	5	0.49	0.16	1.14	0
Elite plus	Elite Plus LPW	282	3,075.1	15	0.49	0.27	0.80	0
Corail	Tritanium	168	822.6	4	0.49	0.13	1.24	15
M/L Taper	Trilogy	215	1,853.2	9	0.49	0.20	0.89	3
Exeter	Trilogy	213	2,940.2	14	0.48	0.26	0.80	0
Exeter V40	Contemporary	6504	4,9605.6	235	0.47	0.42	0.54	114
CLS	Monoblock Acetabular Cup	80	848.4	4	0.47	0.13	1.21	0
Exeter V40	Morscher	630	7,226.3	34	0.47	0.33	0.66	0
Exeter V40	Osteolock	270	3,198.6	15	0.47	0.25	0.75	0
Summit	Trilogy	168	1,286.5	6	0.47	0.17	1.02	11
Accolade	Trident	1867	20,510.0	94	0.46	0.37	0.56	0
H-Max M	Delta-TT Cup	86	656.1	3	0.46	0.09	1.34	0
ABGII	Pinnacle	67	656.3	3	0.46	0.09	1.34	0
Exeter V40	Pinnacle	2448	11,707.0	53	0.45	0.34	0.59	290
Spectron	Mallory-Head	152	1,793.2	8	0.45	0.19	0.88	0
SL monoblock	Muller PE cup	488	5,462.9	24	0.44	0.27	0.64	0
MS 30	Continuum TM	404	1,595.9	7	0.44	0.16	0.86	33
Versys	Trilogy	272	3,889.9	17	0.44	0.25	0.70	0
Exeter	Morscher	551	8,255.2	36	0.44	0.31	0.60	0
Charnley	Charnley	456	5,338.8	23	0.43	0.27	0.64	0
Exeter V40	CCB	567	3,018.0	13	0.43	0.23	0.74	33
Exeter V40	Trident	10390	63,631.7	274	0.43	0.38	0.48	1049
Stemsys	RM Pressfit cup	325	1,189.5	5	0.42	0.14	0.98	38
Lateral straight stem	Continuum TM	78	476.3	2	0.42	0.05	1.52	0
Summit	Duraloc	101	1,212.1	5	0.41	0.13	0.96	0
Exeter	Muller PE cup	119	1,465.0	6	0.41	0.15	0.89	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Exeter V40	Reflection cemented	926	5,623.2	23	0.41	0.26	0.61	35
CCA	RM Pressfit cup	135	1,251.2	5	0.40	0.13	0.93	0
Exeter V40	Trilogy	2805	19,700.1	78	0.40	0.31	0.49	149
CPT	Pinnacle	64	522.6	2	0.38	0.05	1.38	0
Exeter V40	Exeter X3	2103	7,355.7	28	0.38	0.25	0.54	336
Avenir Muller uncemented	Pinnacle	99	799.3	3	0.38	0.05	1.00	0
Trabecular Metal Stem	Monoblock Acetabular Cup	74	822.4	3	0.36	0.05	0.97	0
C-Stem	Elite Plus Ogee	55	548.6	2	0.36	0.04	1.32	0
Standard straight stem	Muller PE cup	629	5,764.2	21	0.36	0.22	0.55	1
Synergy Porous	Reflection porous	1238	11,875.0	43	0.36	0.26	0.48	14
Lateral straight stem	Weber	287	2,865.7	10	0.35	0.17	0.64	0
Standard straight stem	ZCA all-poly cup	50	290.6	1	0.34	0.00	1.92	0
Twinsys cemented	RM cup	148	1,464.9	5	0.34	0.09	0.75	0
MS 30	Muller PE cup	462	4,414.8	15	0.34	0.19	0.56	0
Exeter V40	RM Pressfit cup	2385	10,968.5	37	0.34	0.23	0.46	301
Corail	Delta-PF Cup	80	893.5	3	0.34	0.07	0.98	0
Corail	Ultima	135	1,205.2	4	0.33	0.09	0.85	0
Exeter V40	Muller PE cup	94	906.0	3	0.33	0.07	0.97	0
CLS	Pinnacle	90	614.1	2	0.33	0.04	1.18	10
Exeter V40	Monoblock Acetabular Cup	123	1,575.0	5	0.32	0.10	0.74	0
Echo Bi-Metric	Exceed ABT Ringloc-X	57	316.6	1	0.32	0.01	1.76	0
Corail	Trilogy	207	953.4	3	0.31	0.06	0.92	17
Avenir Muller uncemented	Tritanium	91	647.3	2	0.31	0.04	1.12	0
Standard straight stem	Weber	134	1,294.7	4	0.31	0.08	0.79	0
Exeter V40	Reflection porous	475	4,076.5	12	0.29	0.15	0.51	0
Friendly	Delta-PF Cup	168	1,700.2	5	0.29	0.10	0.69	0
Spectron	R3 porous	432	2,439.2	7	0.29	0.10	0.56	11
Accolade	Tritanium	152	1,063.1	3	0.28	0.06	0.82	0
MS 30	Fitmore	2174	14,197.5	39	0.27	0.20	0.38	192
Versys cemented	Trilogy	237	2,636.1	7	0.27	0.11	0.55	0
Stemsys	DeltaMotion Cup	485	2,413.5	6	0.25	0.08	0.51	44
Twinsys cemented	Continuum TM	108	408.7	1	0.24	0.01	1.36	6
Lateral straight stem	RM Pressfit cup	173	1,253.4	3	0.24	0.05	0.70	0
Basis	Reflection porous	108	844.6	2	0.24	0.03	0.86	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
CPT	ZCA all-poly cup	96	468.8	1	0.21	0.01	1.19	0
MS 30	Trilogy	331	1,958.0	4	0.20	0.06	0.52	19
Exeter V40	CLS Expansion	88	1,008.5	2	0.20	0.02	0.72	0
MS 30	ZCA all-poly cup	94	506.3	1	0.20	0.01	1.10	0
SL modular stem	Muller PE cup	83	1,104.8	2	0.18	0.02	0.65	0
Exeter V40	Weber	53	561.9	1	0.18	0.00	0.99	0
Exeter V40	ZCA	93	574.3	1	0.17	0.00	0.97	8
Exeter V40	Fitmore	963	4,733.5	8	0.17	0.07	0.33	91
Corail	Reflection porous	140	1,360.4	2	0.15	0.02	0.53	0
Lateral straight stem	ZCA	98	750.9	1	0.13	0.00	0.74	0
Synergy Porous	Delta-PF Cup	88	779.7	1	0.13	0.00	0.71	0
Accolade	Pinnacle	180	1,609.3	2	0.12	0.02	0.45	0
Avenir Muller uncemented	RM cup	105	825.7	1	0.12	0.00	0.67	0
Stemsys	Delta-PF Cup	396	1,077.1	1	0.09	0.00	0.43	74
Standard straight stem	RM Pressfit cup	137	1,090.0	1	0.09	0.00	0.51	0
Twinsys uncemented	Delta-PF Cup	370	3,000.8	1	0.03	0.00	0.19	0
Exeter V40	Polymax	63	61.3	0	0.00	0.00	6.02	35
Stemsys cemented	RM Pressfit cup	64	142.1	0	0.00	0.00	2.60	18
C-Stem	Marathon cemented	89	310.1	0	0.00	0.00	1.19	14
Twinsys cemented	Reflection porous	59	174.7	0	0.00	0.00	2.11	9
Synergy Porous	Continuum TM	55	120.5	0	0.00	0.00	3.06	6
Exeter V40	ZCA all-poly cup	104	432.0	0	0.00	0.00	0.85	4
Corail	DeltaMotion Cup	78	518.8	0	0.00	0.00	0.71	0
Exeter	Trident	84	1,270.3	0	0.00	0.00	0.29	0
Lateral straight stem	ZCA all-poly cup	70	422.4	0	0.00	0.00	0.87	0

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

(Minimum of 50 primary registered arthroplasties)

Fully Cemented

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter V40	Contemporary	6,504	49,605.6	235	0.47	0.42	0.54
Spectron	Reflection cemented	2,956	29,689.6	353	1.19	1.07	1.32
Exeter V40	Exeter X3	2,103	7,355.7	28	0.38	0.25	0.54
Exeter V40	Exeter	1,639	15,405.7	84	0.55	0.43	0.67
Exeter	Contemporary	1,551	18,301.8	182	0.99	0.85	1.15
Exeter	Exeter	1,326	15,253.9	114	0.75	0.62	0.90
Exeter V40	Reflection cemented	926	5,623.2	23	0.41	0.26	0.61
CCA	CCB	769	6,078.6	31	0.51	0.34	0.71
Lateral straight stem	Muller PE cup	750	7,185.8	39	0.54	0.39	0.74
Standard straight stem	Muller PE cup	629	5,764.2	21	0.36	0.22	0.55
Exeter V40	CCB	567	3,018.0	13	0.43	0.23	0.74
CPT	ZCA	545	5,487.9	35	0.64	0.44	0.89
SL monoblock	Muller PE cup	488	5,462.9	24	0.44	0.27	0.64
MS 30	Muller PE cup	462	4,414.8	15	0.34	0.19	0.56
Charnley	Charnley	456	5,338.8	23	0.43	0.27	0.64
Twinsys cemented	CCB	441	2,331.4	15	0.64	0.36	1.06
Versys cemented	ZCA	391	4,200.1	26	0.62	0.39	0.89
C-Stem AMT	Marathon cemented	330	1,763.1	10	0.57	0.27	1.04
Charnley	Charnley Cup Ogee	303	3,856.2	28	0.73	0.48	1.05
Elite plus	Charnley	298	3,661.5	23	0.63	0.40	0.94
Lateral straight stem	Weber	287	2,865.7	10	0.35	0.17	0.64
Elite plus	Elite Plus LPW	282	3,075.1	15	0.49	0.27	0.80
Exeter V40	Bio-clad poly	140	980.3	7	0.71	0.29	1.47
Standard straight stem	Weber	134	1,294.7	4	0.31	0.08	0.79
MS 30	Contemporary	128	1,229.7	10	0.81	0.39	1.50
Exeter	Muller PE cup	119	1,465.0	6	0.41	0.15	0.89
Exeter	Bio-clad poly	113	1,254.7	7	0.56	0.22	1.15
Elite plus	Elite Plus Ogee	110	1,084.5	6	0.55	0.20	1.20
Exeter V40	ZCA all-poly cup	104	432.0	0	0.00	0.00	0.85
Lateral straight stem	ZCA	98	750.9	1	0.13	0.00	0.74
CPT	ZCA all-poly cup	96	468.8	1	0.21	0.01	1.19
Exeter V40	Muller PE cup	94	906.0	3	0.33	0.07	0.97
MS 30	ZCA all-poly cup	94	506.3	1	0.20	0.01	1.10
Exeter V40	ZCA	93	574.3	1	0.17	0.00	0.97

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
C-Stem	Marathon cemented	89	310.1	0	0.00	0.00	1.19
SL modular stem	Muller PE cup	83	1,104.8	2	0.18	0.02	0.65
CCA	Contemporary	74	762.2	10	1.31	0.63	2.41
Contemporary	Contemporary	71	912.4	12	1.32	0.68	2.30
Lateral straight stem	ZCA all-poly cup	70	422.4	0	0.00	0.00	0.87
Spectron	Muller PE cup	66	658.5	8	1.21	0.52	2.39
C-Stem	Elite Plus Ogee	55	548.6	2	0.36	0.04	1.32
Exeter V40	Weber	53	561.9	1	0.18	0.00	0.99
Standard straight stem	ZCA all-poly cup	50	290.6	1	0.34	0.00	1.92

Uncemented

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Corail	Pinnacle	10,351	48,382.9	331	0.68	0.61	0.76
Twinsys uncemented	RM Pressfit cup	4,855	29,448.8	191	0.65	0.56	0.75
CLS	Fitmore	2,300	23,622.5	117	0.50	0.41	0.59
Summit	Pinnacle	2,248	13,418.1	101	0.75	0.61	0.91
Accolade	Trident	1,867	20,510.0	94	0.46	0.37	0.56
Synergy Porous	R3 porous	1,779	7,919.5	58	0.73	0.56	0.95
CLS	Morscher	1,682	22,801.5	112	0.49	0.40	0.59
Polarstem uncemented	R3 porous	1,517	4,554.6	25	0.55	0.36	0.81
CLS	CLS Expansion	1,263	15,710.0	118	0.75	0.62	0.90
Synergy Porous	Reflection porous	1,238	11,875.0	43	0.36	0.26	0.48
Twinsys uncemented	Selexys TPS	1,231	10,413.9	136	1.31	1.09	1.54
M/L Taper	Continuum TM	1,001	4,111.7	34	0.83	0.57	1.16
Accolade II	Tritanium	935	2,381.4	14	0.59	0.32	0.99
Accolade II	Trident	858	2,158.4	16	0.74	0.42	1.20
H-Max S	Delta-TT Cup	736	2,936.0	27	0.92	0.59	1.32
CLS	Continuum TM	719	2,920.8	22	0.75	0.47	1.14
Stemsys	Fixa Ti Por	707	2,700.6	14	0.52	0.27	0.85
CLS	Duraloc	699	9,128.1	91	1.00	0.80	1.22
CLS	Trilogy	596	4,236.2	25	0.59	0.38	0.87
CLS	RM Pressfit cup	567	3,853.8	25	0.65	0.42	0.96
Stemsys	DeltaMotion Cup	485	2,413.5	6	0.25	0.08	0.51
Corail	Duraloc	464	5,139.0	49	0.95	0.71	1.26
Trabecular Metal Stem	Continuum TM	447	2,151.9	18	0.84	0.50	1.32
CBC	RM Pressfit cup	444	2,688.8	21	0.78	0.48	1.19

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Stemsys	Agilis Ti-por	438	1,500.1	14	0.93	0.49	1.52
Stemsys	Delta-PF Cup	396	1,077.1	1	0.09	0.00	0.43
S-Rom	Pinnacle	375	3,633.1	35	0.96	0.66	1.32
CLS	Reflection porous	373	2,990.9	20	0.67	0.41	1.03
Twinsys uncemented	Delta-PF Cup	370	3,000.8	1	0.03	0.00	0.16
ABGII	Trident	342	4,038.1	34	0.84	0.58	1.18
Polarstem uncemented	Reflection porous	335	2,072.2	14	0.68	0.37	1.13
Stemsys	RM Pressfit cup	325	1,189.5	5	0.42	0.14	0.98
Echo Bi-Metric	G7 acetabular shell	320	722.1	5	0.69	0.22	1.62
Corail	Continuum TM	304	1,099.0	8	0.73	0.31	1.43
Corail	Fitmore	285	893.5	7	0.78	0.31	1.61
Versys	Trilogy	272	3,889.9	17	0.44	0.25	0.70
Taperloc Complete	G7 acetabular shell	259	390.5	6	1.54	0.56	3.34
M/L Taper	Trident	248	746.2	5	0.67	0.22	1.56
M/L Taper	Trilogy	215	1,853.2	9	0.49	0.20	0.89
Twinsys uncemented	Trilogy	209	1,811.7	11	0.61	0.30	1.09
Corail	Trilogy	207	953.4	3	0.31	0.06	0.92
CLS	Durom	198	1,950.2	63	3.23	2.48	4.13
H-Max S	Delta-PF Cup	193	589.8	7	1.19	0.42	2.33
CLS	Allofit	192	1,924.0	20	1.04	0.61	1.57
CBC	Expansys shell	183	1,791.9	25	1.40	0.90	2.06
Accolade	Pinnacle	180	1,609.3	2	0.12	0.02	0.45
Avenir Muller uncemented	Continuum TM	179	1,074.6	11	1.02	0.51	1.83
Corail	Tritanium	168	822.6	4	0.49	0.13	1.24
Summit	Trilogy	168	1,286.5	6	0.47	0.17	1.02
Taperloc Complete	RM Pressfit cup	168	266.9	5	1.87	0.61	4.37
CLS	Trident	165	1,862.0	14	0.75	0.39	1.23
Corail	ASR	156	1,199.7	83	6.92	5.51	8.58
Accolade	Tritanium	152	1,063.1	3	0.28	0.06	0.82
Corail	RM Pressfit cup	144	504.8	5	0.99	0.32	2.31
Corail	Reflection porous	140	1,360.4	2	0.15	0.02	0.53
ABGII	Duraloc	139	1,929.9	40	2.07	1.46	2.79
Twinsys uncemented	Continuum TM	133	821.0	5	0.61	0.20	1.42
S-Rom	ASR	130	801.1	94	11.73	9.43	14.29
Omnifit	Trident	126	1,561.3	12	0.77	0.37	1.30
Twinsys uncemented	RM cup	122	1,036.2	9	0.87	0.40	1.65
Stemsys	Polymax	119	254.4	3	1.18	0.24	3.45
ABG	Duraloc	116	1,860.4	38	2.04	1.42	2.77
Synergy Porous	BHR Acetabular Cup	114	1,034.2	40	3.87	2.76	5.27

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
CLS	RM cup	113	1,173.0	17	1.45	0.81	2.27
Prodigy	Duraloc	113	1,479.9	23	1.55	0.99	2.33
Taperloc Complete	Continuum TM	108	101.1	3	2.97	0.61	8.67
ABGII	Delta-PF Cup	107	1,273.7	11	0.86	0.43	1.55
CLS	Weill ring	106	1,601.3	10	0.62	0.28	1.11
Echo Bi-Metric	Continuum TM	106	183.8	3	1.63	0.34	4.77
Optimys	RM Pressfit cup	106	140.0	1	0.71	0.02	3.98
Avenir Muller uncemented	RM cup	105	825.7	1	0.12	0.00	0.67
Mallory-Head	M2A	105	1,237.7	15	1.21	0.68	2.00
Summit	Duraloc	101	1,212.1	5	0.41	0.13	0.96
Avenir Muller uncemented	Pinnacle	99	799.3	3	0.38	0.05	1.00
Corail	Monoblock Acetabular Cup	95	941.1	5	0.53	0.17	1.24
Anthology Porous	BHR Acetabular Cup	91	713.9	49	6.86	5.08	9.07
Avenir Muller uncemented	Tritanium	91	647.3	2	0.31	0.04	1.12
CLS	Pinnacle	90	614.1	2	0.33	0.04	1.18
Corail	Trident	88	480.8	3	0.62	0.13	1.82
Summit	ASR	88	741.0	36	4.86	3.40	6.73
Synergy Porous	Delta-PF Cup	88	779.7	1	0.13	0.00	0.71
H-Max M	Delta-TT Cup	86	656.1	3	0.46	0.09	1.34
ABGII	RM Pressfit cup	81	218.5	6	2.75	1.01	5.98
CLS	Monoblock Acetabular Cup	80	848.4	4	0.47	0.13	1.21
CLS	Tritanium	80	362.3	3	0.83	0.17	2.42
Corail	Delta-PF Cup	80	893.5	3	0.34	0.07	0.98
Accolade II	RM Pressfit cup	79	126.2	3	2.38	0.49	6.95
Corail	DeltaMotion Cup	78	518.8	0	0.00	0.00	0.71
S-Rom	Ultima	78	1,250.4	14	1.12	0.61	1.88
AML MMA	Duraloc	74	1,034.3	11	1.06	0.50	1.84
Trabecular Metal Stem	Monoblock Acetabular Cup	74	822.4	3	0.36	0.05	0.97
Wagner cone stem	Fitmore	73	803.3	4	0.50	0.14	1.27
ABG	ABGII	72	1,098.6	16	1.46	0.83	2.37
Accolade II	Delta-TT Cup	72	125.6	1	0.80	0.02	4.43
H-Max M	Delta-PF Cup	71	535.0	7	1.31	0.53	2.70
Anthology Porous	R3 porous	68	486.2	32	6.58	4.42	9.17
ABGII	Pinnacle	67	656.3	3	0.46	0.09	1.34
Furlong	Furlong	66	789.3	6	0.76	0.28	1.65
Avenir Muller uncemented	Fitmore	65	196.3	1	0.51	0.01	2.84

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
M/L Taper	Delta-TT Cup	64	323.4	5	1.55	0.50	3.61
Tri-Lock BPS	Pinnacle	63	425.3	3	0.71	0.10	1.88
CBC	Fitmore	59	597.2	5	0.84	0.27	1.95
CLS	Artek	59	712.1	25	3.51	2.27	5.18
MasterSL	Delta-TT Cup	59	52.6	2	3.81	0.46	13.75
Echo Bi-Metric	Exceed ABT Ringloc-X	57	316.6	1	0.32	0.01	1.76
Synergy Porous	Continuum TM	55	120.5	0	0.00	0.00	3.06
AML	Duraloc	53	780.7	7	0.90	0.36	1.85
CLS	Trabecular Metal Shell	53	420.1	3	0.71	0.15	2.09
Avenir Muller uncemented	RM Pressfit cup	51	158.0	1	0.63	0.02	3.53

Hybrid

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter V40	Trident	10,390	63,631.7	274	0.43	0.38	0.48
Exeter V40	Tritanium	3,120	11,169.7	74	0.66	0.52	0.83
Exeter V40	Trilogy	2,805	19,700.1	78	0.40	0.31	0.49
Spectron	Reflection porous	2,755	27,633.0	228	0.83	0.72	0.94
Exeter V40	Continuum TM	2,538	10,125.6	86	0.85	0.68	1.05
Exeter V40	Pinnacle	2,448	11,707.0	53	0.45	0.34	0.59
Exeter V40	RM Pressfit cup	2,385	10,968.5	37	0.34	0.23	0.46
C-Stem AMT	Pinnacle	2,339	8,132.8	66	0.81	0.62	1.03
MS 30	Fitmore	2,174	14,197.5	39	0.27	0.20	0.38
Twinsys cemented	RM Pressfit cup	1,864	8,557.7	42	0.49	0.35	0.66
CPT	Continuum TM	1,387	4,915.7	46	0.94	0.69	1.25
Spectron	Duraloc	1,151	13,752.9	177	1.29	1.10	1.49
Exeter V40	Duraloc	987	10,786.5	100	0.93	0.75	1.12
Exeter V40	Fitmore	963	4,733.5	8	0.17	0.07	0.33
CPT	Trilogy	843	6,459.6	56	0.87	0.65	1.13
Exeter	Osteolock	836	11,108.7	75	0.68	0.53	0.85
MS 30	Morscher	787	9,737.6	61	0.63	0.48	0.80
Exeter V40	Morscher	630	7,226.3	34	0.47	0.33	0.66
Elite plus	Duraloc	608	7,022.0	112	1.59	1.31	1.92
Exeter V40	R3 porous	605	2,186.6	15	0.69	0.38	1.13
Exeter	Duraloc	553	7,808.0	113	1.45	1.19	1.74
Exeter	Morscher	551	8,255.2	36	0.44	0.31	0.60
Lateral straight stem	RM cup	533	5,245.0	42	0.80	0.58	1.08

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Exeter V40	Reflection porous	475	4,076.5	12	0.29	0.15	0.51
Spectron	R3 porous	432	2,439.2	7	0.29	0.10	0.56
MS 30	Continuum TM	404	1,595.9	7	0.44	0.18	0.90
MS 30	Trilogy	331	1,958.0	4	0.20	0.06	0.52
CPCS	R3 porous	326	889.9	6	0.67	0.21	1.39
SL modular stem	RM cup	322	4,578.4	40	0.87	0.62	1.19
Exeter V40	Osteolock	270	3,198.6	15	0.47	0.26	0.77
Versys cemented	Trilogy	237	2,636.1	7	0.27	0.11	0.55
Exeter V40	Delta-TT Cup	223	771.1	5	0.65	0.21	1.51
Exeter	Trilogy	213	2,940.2	14	0.48	0.26	0.80
CPT	Duraloc	212	2,467.9	16	0.65	0.37	1.05
Exeter V40	Trabecular Metal Shell	211	1,079.1	13	1.20	0.64	2.06
Spectron	Morscher	210	2,769.6	31	1.12	0.76	1.59
CPT	Fitmore	191	1,053.9	10	0.95	0.42	1.68
Lateral straight stem	RM Pressfit cup	173	1,253.4	3	0.24	0.05	0.70
Friendly	Delta-PF Cup	168	1,700.2	5	0.29	0.10	0.69
Spectron	Mallory-Head	152	1,793.2	8	0.45	0.19	0.88
Twinsys cemented	RM cup	148	1,464.9	5	0.34	0.09	0.75
CPT	Trident	145	1,620.2	12	0.74	0.38	1.29
Standard straight stem	RM cup	138	1,540.2	11	0.71	0.33	1.24
Standard straight stem	RM Pressfit cup	137	1,090.0	1	0.09	0.00	0.51
CCA	RM Pressfit cup	135	1,251.2	5	0.40	0.13	0.93
Corail	Ultima	134	1,196.0	4	0.33	0.09	0.86
C-Stem AMT	RM Pressfit cup	129	467.7	4	0.86	0.23	2.19
Exeter	CLS Expansion	129	1,578.9	10	0.63	0.30	1.16
Exeter V40	Monoblock Acetabular Cup	123	1,575.0	5	0.32	0.10	0.74
Accolade	Muller PE cup	114	1,206.7	7	0.58	0.21	1.14
Exeter V40	G7 acetabular shell	112	212.7	3	1.41	0.29	4.12
Basis	Reflection porous	108	844.6	2	0.24	0.03	0.86
Twinsys cemented	Continuum TM	108	408.7	1	0.24	0.01	1.36
MS 30	RM Pressfit cup	90	774.5	4	0.52	0.14	1.32
Exeter V40	CLS Expansion	88	1,008.5	2	0.20	0.02	0.72
CPT	Tritanium	85	611.2	6	0.98	0.36	2.14
CPT	Monoblock Acetabular Cup	84	937.6	8	0.85	0.33	1.61
Exeter	Trident	84	1,270.3	0	0.00	0.00	0.29
CPT	Delta-TT Cup	79	182.5	3	1.64	0.23	4.39
Lateral straight stem	Continuum TM	78	476.3	2	0.42	0.05	1.52

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Spectron	Fitmore	78	978.2	5	0.51	0.14	1.12
Spectron	Trident	78	886.1	5	0.56	0.15	1.24
C-Stem	Pinnacle	77	260.2	4	1.54	0.42	3.94
Twinsys cemented	Pinnacle	76	286.1	7	2.45	0.98	5.04
Lateral straight stem	Trilogy	69	555.6	12	2.16	1.12	3.77
Spectron	Biomex acet shell porous	68	1,023.2	5	0.49	0.16	1.14
Friendly	Delta-TT Cup	67	410.6	5	1.22	0.40	2.84
Twinsys cemented	Selexys TPS	65	458.4	5	1.09	0.35	2.55
CPT	Pinnacle	64	522.6	2	0.38	0.05	1.38
Stemsys cemented	RM Pressfit cup	64	142.1	0	0.00	0.00	2.60
Exeter V40	Polymax	63	61.3	0	0.00	0.00	6.02
H-Max C	Delta-TT Cup	61	134.1	2	1.49	0.18	5.39
Twinsys cemented	Reflection porous	59	174.7	0	0.00	0.00	2.11
CPT	G7 acetabular shell	58	95.0	3	3.16	0.65	9.23
MS 30	Duraloc	55	776.5	6	0.77	0.28	1.68
C-Stem	Duraloc	53	634.1	6	0.95	0.30	1.95

Prosthesis combinations based on femur in alphabetical order

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
ABG	Duraloc	116	1,860.4	38	2.04	1.42	2.77	0
ABG	ABGII	72	1,098.6	16	1.46	0.83	2.37	0
ABGII	RM Pressfit cup	81	218.5	6	2.75	1.01	5.98	12
ABGII	Duraloc	139	1,929.9	40	2.07	1.46	2.79	0
ABGII	Delta-PF Cup	107	1,273.7	11	0.86	0.40	1.49	0
ABGII	Trident	342	4,038.1	34	0.84	0.58	1.18	0
ABGII	Pinnacle	67	656.3	3	0.46	0.09	1.34	0
Accolade	Muller PE cup	114	1,206.7	7	0.58	0.21	1.14	0
Accolade	Trident	1867	20,510.0	94	0.46	0.37	0.56	0
Accolade	Tritanium	152	1,063.1	3	0.28	0.06	0.82	0
Accolade	Pinnacle	180	1,609.3	2	0.12	0.02	0.45	0
Accolade II	RM Pressfit cup	79	126.2	3	2.38	0.49	6.95	27
Accolade II	Delta-TT Cup	72	125.6	1	0.80	0.02	4.43	18
Accolade II	Trident	858	2,158.4	16	0.74	0.42	1.20	219
Accolade II	Tritanium	935	2,381.4	14	0.59	0.32	0.99	200
AML	Duraloc	53	780.7	7	0.90	0.36	1.85	0
AML MMA	Duraloc	74	1,034.3	11	1.06	0.50	1.84	0
Anthology Porous	BHR Acetabular Cup	93	726.3	50	6.88	5.11	9.08	0
Anthology Porous	R3 porous	68	486.2	32	6.58	4.42	9.17	1

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Avenir Muller uncemented	Continuum TM	179	1,074.6	11	1.02	0.51	1.83	1
Avenir Muller uncemented	RM Pressfit cup	51	158.0	1	0.63	0.02	3.53	2
Avenir Muller uncemented	Fitmore	65	196.3	1	0.51	0.01	2.84	27
Avenir Muller uncemented	Pinnacle	99	799.3	3	0.38	0.05	1.00	0
Avenir Muller uncemented	Tritanium	91	647.3	2	0.31	0.04	1.12	0
Avenir Muller uncemented	RM cup	105	825.7	1	0.12	0.00	0.67	0
Basis	Reflection porous	108	844.6	2	0.24	0.03	0.86	0
CBC	Expansys shell	183	1,791.9	25	1.40	0.90	2.06	0
CBC	Fitmore	59	597.2	5	0.84	0.27	1.95	0
CBC	RM Pressfit cup	444	2,688.8	21	0.78	0.48	1.19	12
CCA	Contemporary	74	762.2	10	1.31	0.63	2.41	0
CCA	CCB	769	6,078.6	31	0.51	0.34	0.71	4
CCA	RM Pressfit cup	135	1,251.2	5	0.40	0.13	0.93	0
Charnley	Charnley Cup Ogee	303	3,856.2	28	0.73	0.48	1.05	0
Charnley	Charnley	456	5,338.8	23	0.43	0.27	0.64	0
CLS	Artek	59	712.1	25	3.51	2.22	5.10	0
CLS	Durom	198	1,950.2	63	3.23	2.48	4.13	0
CLS	RM cup	113	1,173.0	17	1.45	0.81	2.27	0
CLS	Allofit	192	1,924.0	20	1.04	0.61	1.57	0
CLS	Duraloc	699	9,128.1	91	1.00	0.80	1.22	0
CLS	Tritanium	80	362.3	3	0.83	0.17	2.42	4
CLS	Continuum TM	719	2,920.8	22	0.75	0.47	1.14	75
CLS	Trident	165	1,862.0	14	0.75	0.39	1.23	0
CLS	CLS Expansion	1263	15,710.0	118	0.75	0.62	0.90	0
CLS	Trabecular Metal Shell	53	420.1	3	0.71	0.15	2.09	2
CLS	Reflection porous	373	2,990.9	20	0.67	0.41	1.03	15
CLS	RM Pressfit cup	567	3,853.8	25	0.65	0.42	0.96	27
CLS	Weill ring	106	1601.3	10	0.62	0.28	1.11	0
CLS	Trilogy	596	4,236.2	25	0.59	0.38	0.87	24
CLS	Fitmore	2300	23,622.5	117	0.50	0.41	0.59	34
CLS	Morscher	1682	22,801.5	112	0.49	0.40	0.59	0
CLS	Monoblock Acetabular Cup	80	848.4	4	0.47	0.13	1.21	0
CLS	Pinnacle	90	614.1	2	0.33	0.04	1.18	10
Contemporary	Contemporary	71	912.4	12	1.32	0.68	2.30	0
Corail	ASR	156	1,199.7	83	6.92	5.51	8.58	0
Corail	RM Pressfit cup	144	504.8	5	0.99	0.32	2.31	7

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Corail	Duraloc	464	5,139.0	49	0.95	0.71	1.26	0
Corail	Fitmore	285	893.5	7	0.78	0.31	1.61	17
Corail	Continuum TM	304	1,099.0	8	0.73	0.31	1.43	35
Corail	Pinnacle	10351	48,382.9	331	0.68	0.61	0.76	1471
Corail	Trident	88	480.8	3	0.62	0.13	1.82	8
Corail	Monoblock Acetabular Cup	95	941.1	5	0.53	0.17	1.24	0
Corail	Tritanium	168	822.6	4	0.49	0.13	1.24	15
Corail	Delta-PF Cup	80	893.5	3	0.34	0.07	0.98	0
Corail	Ultima	135	1,205.2	4	0.33	0.09	0.85	0
Corail	Trilogy	207	953.4	3	0.31	0.06	0.92	17
Corail	Reflection porous	140	1,360.4	2	0.15	0.02	0.53	0
Corail	DeltaMotion Cup	78	518.8	0	0.00	0.00	0.71	0
CPCS	R3 porous	326	889.9	6	0.67	0.21	1.39	63
CPT	G7 acetabular shell	58	95.0	3	3.16	0.65	9.23	26
CPT	Delta-TT Cup	79	182.5	3	1.64	0.34	4.80	18
CPT	Tritanium	85	611.2	6	0.98	0.36	2.14	0
CPT	Fitmore	191	1,053.9	10	0.95	0.46	1.75	10
CPT	Continuum TM	1387	4,915.7	46	0.94	0.69	1.25	191
CPT	Trilogy	843	6,459.6	56	0.87	0.65	1.13	1
CPT	Monoblock Acetabular Cup	84	937.6	8	0.85	0.33	1.61	0
CPT	Trident	145	1,620.2	12	0.74	0.38	1.29	0
CPT	Duraloc	212	2,467.9	16	0.65	0.37	1.05	0
CPT	ZCA	545	5,487.9	35	0.64	0.44	0.89	2
CPT	Pinnacle	64	522.6	2	0.38	0.05	1.38	0
CPT	ZCA all-poly cup	96	468.8	1	0.21	0.01	1.19	0
C-Stem	Pinnacle	77	260.2	4	1.54	0.42	3.94	12
C-Stem	Duraloc	53	634.1	6	0.95	0.35	2.06	0
C-Stem	Elite Plus Ogee	55	548.6	2	0.36	0.04	1.32	0
C-Stem	Marathon cemented	89	310.1	0	0.00	0.00	1.19	14
C-Stem AMT	RM Pressfit cup	129	467.7	4	0.86	0.23	2.19	23
C-Stem AMT	Pinnacle	2339	8,132.8	66	0.81	0.62	1.03	356
C-Stem AMT	Marathon cemented	330	1,763.1	10	0.57	0.27	1.04	14
Echo Bi-Metric	Continuum TM	106	183.8	3	1.63	0.34	4.77	26
Echo Bi-Metric	G7 acetabular shell	320	722.1	5	0.69	0.22	1.62	95
Echo Bi-Metric	Exceed ABT Ringloc-X	57	316.6	1	0.32	0.01	1.76	0
Elite plus	Duraloc	608	7,022.0	112	1.59	1.31	1.92	0
Elite plus	Charnley	298	3,661.5	23	0.63	0.40	0.94	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Elite plus	Elite Plus Ogee	110	1,084.5	6	0.55	0.20	1.20	0
Elite plus	Elite Plus LPW	282	3,075.1	15	0.49	0.27	0.80	0
Exeter	Duraloc	553	7,808.0	113	1.45	1.19	1.74	0
Exeter	Contemporary	1551	18,301.8	182	0.99	0.85	1.15	0
Exeter	Exeter	1326	15,253.9	114	0.75	0.62	0.90	0
Exeter	Osteolock	836	11,108.7	75	0.68	0.53	0.85	0
Exeter	CLS Expansion	129	1,578.9	10	0.63	0.30	1.16	0
Exeter	Bio-clad poly	113	1,254.7	7	0.56	0.22	1.15	0
Exeter	Trilogy	213	2,940.2	14	0.48	0.26	0.80	0
Exeter	Morscher	551	8,255.2	36	0.44	0.31	0.60	0
Exeter	Muller PE cup	119	1,465.0	6	0.41	0.15	0.89	0
Exeter	Trident	84	1,270.3	0	0.00	0.00	0.29	0
Exeter V40	G7 acetabular shell	112	212.7	3	1.41	0.29	4.12	39
Exeter V40	Trabecular Metal Shell	211	1,079.1	13	1.20	0.64	2.06	14
Exeter V40	Duraloc	987	10,786.5	100	0.93	0.75	1.12	0
Exeter V40	Continuum TM	2539	10,125.6	86	0.85	0.68	1.05	236
Exeter V40	Bio-clad poly	140	980.3	7	0.71	0.29	1.47	0
Exeter V40	R3 porous	605	2,186.6	15	0.69	0.38	1.13	70
Exeter V40	Tritanium	3120	11,169.7	74	0.66	0.52	0.83	418
Exeter V40	Delta-TT Cup	223	771.1	5	0.65	0.21	1.51	34
Exeter V40	Exeter	1639	15,405.7	84	0.55	0.43	0.68	1
Exeter V40	Contemporary	6504	49,605.6	235	0.47	0.42	0.54	114
Exeter V40	Morscher	630	7226.3	34	0.47	0.33	0.66	0
Exeter V40	Osteolock	270	3,198.6	15	0.47	0.25	0.75	0
Exeter V40	Pinnacle	2448	11,707.0	53	0.45	0.34	0.59	290
Exeter V40	CCB	567	3,018.0	13	0.43	0.23	0.74	33
Exeter V40	Trident	10390	63,631.7	274	0.43	0.38	0.48	1049
Exeter V40	Reflection cemented	926	5,623.2	23	0.41	0.26	0.61	35
Exeter V40	Trilogy	2805	19,700.1	78	0.40	0.31	0.49	149
Exeter V40	Exeter X3	2103	7,355.7	28	0.38	0.25	0.54	336
Exeter V40	RM Pressfit cup	2385	10,968.5	37	0.34	0.23	0.46	301
Exeter V40	Muller PE cup	94	906.0	3	0.33	0.07	0.97	0
Exeter V40	Monoblock Acetabular Cup	123	1,575.0	5	0.32	0.10	0.74	0
Exeter V40	Reflection porous	475	4,076.5	12	0.29	0.15	0.51	0
Exeter V40	CLS Expansion	88	1,008.5	2	0.20	0.02	0.72	0
Exeter V40	Weber	53	561.9	1	0.18	0.00	0.99	0
Exeter V40	ZCA	93	574.3	1	0.17	0.00	0.97	8
Exeter V40	Fitmore	963	4,733.5	8	0.17	0.07	0.33	91
Exeter V40	Polymax	63	61.3	0	0.00	0.00	6.02	35

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Exeter V40	ZCA all-poly cup	104	432.0	0	0.00	0.00	0.85	4
Friendly	Delta-TT Cup	67	410.6	5	1.22	0.40	2.84	1
Friendly	Delta-PF Cup	168	1,700.2	5	0.29	0.10	0.69	0
Furlong	Furlong	66	789.3	6	0.76	0.28	1.65	0
H-Max C	Delta-TT Cup	61	134.1	2	1.49	0.18	5.39	21
H-Max M	Delta-PF Cup	71	535.0	7	1.31	0.47	2.57	0
H-Max M	Delta-TT Cup	86	656.1	3	0.46	0.09	1.34	0
H-Max S	Delta-PF Cup	194	591.6	7	1.18	0.42	2.32	10
H-Max S	Delta-TT Cup	737	2,937.5	27	0.92	0.59	1.32	48
Lateral straight stem	Trilogy	69	555.6	12	2.16	1.12	3.77	0
Lateral straight stem	RM cup	533	5245.0	42	0.80	0.58	1.08	0
Lateral straight stem	Muller PE cup	750	7,185.8	39	0.54	0.39	0.74	1
Lateral straight stem	Continuum TM	78	476.3	2	0.42	0.05	1.52	0
Lateral straight stem	Weber	287	2,865.7	10	0.35	0.17	0.64	0
Lateral straight stem	RM Pressfit cup	173	1,253.4	3	0.24	0.05	0.70	0
Lateral straight stem	ZCA	98	750.9	1	0.13	0.00	0.74	0
Lateral straight stem	ZCA all-poly cup	70	422.4	0	0.00	0.00	0.87	0
M/L Taper	Delta-TT Cup	64	323.4	5	1.55	0.50	3.61	0
M/L Taper	Continuum TM	1004	4,120.2	34	0.83	0.57	1.15	123
M/L Taper	Trident	249	748.4	5	0.67	0.22	1.56	52
M/L Taper	Trilogy	215	1,853.2	9	0.49	0.20	0.89	3
Mallory-Head	M2A	105	1,237.7	15	1.21	0.68	2.00	0
MasterSL	Delta-TT Cup	59	52.6	2	3.81	0.46	13.75	36
MS 30	Contemporary	128	1,229.7	10	0.81	0.39	1.50	0
MS 30	Duraloc	55	776.5	6	0.77	0.28	1.68	0
MS 30	Morscher	787	9,737.6	61	0.63	0.48	0.80	0
MS 30	RM Pressfit cup	90	774.5	4	0.52	0.14	1.32	0
MS 30	Continuum TM	404	1,595.9	7	0.44	0.16	0.86	33
MS 30	Muller PE cup	462	4,414.8	15	0.34	0.19	0.56	0
MS 30	Fitmore	2174	14,197.5	39	0.27	0.20	0.38	192
MS 30	Trilogy	331	1,958.0	4	0.20	0.06	0.52	19
MS 30	ZCA all-poly cup	94	506.3	1	0.20	0.01	1.10	0
Omnifit	Trident	149	1,814.5	13	0.72	0.36	1.19	0
Optimys	RM Pressfit cup	106	140.0	1	0.71	0.02	3.98	46
Polarstem uncemented	Reflection porous	335	2,072.2	14	0.68	0.37	1.13	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Polarstem uncemented	R3 porous	1517	4,554.6	25	0.55	0.36	0.81	271
Prodigy	Duraloc	113	1,479.9	23	1.55	0.99	2.33	0
SL modular stem	RM cup	322	4,578.4	40	0.87	0.62	1.19	0
SL modular stem	Muller PE cup	83	1,104.8	2	0.18	0.02	0.65	0
SL monoblock	Muller PE cup	488	5,462.9	24	0.44	0.27	0.64	0
Spectron	Duraloc	1151	13,752.9	177	1.29	1.10	1.49	0
Spectron	Muller PE cup	66	658.5	8	1.21	0.52	2.39	0
Spectron	Reflection cemented	2956	29,689.6	353	1.19	1.07	1.32	2
Spectron	Morscher	210	2,769.6	31	1.12	0.76	1.59	0
Spectron	Reflection porous	2755	27,633.0	228	0.83	0.72	0.94	0
Spectron	Trident	78	886.1	5	0.56	0.15	1.24	0
Spectron	Fitmore	78	978.2	5	0.51	0.14	1.12	0
Spectron	Biomex acet shell porous	68	1023.2	5	0.49	0.16	1.14	0
Spectron	Mallory-Head	152	1,793.2	8	0.45	0.19	0.88	0
Spectron	R3 porous	432	2,439.2	7	0.29	0.10	0.56	11
S-Rom	ASR	130	801.1	94	11.73	9.43	14.29	0
S-Rom	Ultima	78	1,250.4	14	1.12	0.61	1.88	0
S-Rom	Pinnacle	375	3,633.1	35	0.96	0.66	1.32	8
Standard straight stem	RM cup	138	1,540.2	11	0.71	0.33	1.24	0
Standard straight stem	Muller PE cup	629	5,764.2	21	0.36	0.22	0.55	1
Standard straight stem	ZCA all-poly cup	50	290.6	1	0.34	0.00	1.92	0
Standard straight stem	Weber	134	1,294.7	4	0.31	0.08	0.79	0
Standard straight stem	RM Pressfit cup	137	1,090.0	1	0.09	0.00	0.51	0
Stemsys	Polymax	119	254.4	3	1.18	0.24	3.45	20
Stemsys	Agilis Ti-por	439	1,501.4	14	0.93	0.49	1.52	46
Stemsys	Fixa Ti Por	707	2,700.6	14	0.52	0.27	0.85	77
Stemsys	RM Pressfit cup	325	1,189.5	5	0.42	0.14	0.98	38
Stemsys	DeltaMotion Cup	485	2,413.5	6	0.25	0.08	0.51	44
Stemsys	Delta-PF Cup	396	1,077.1	1	0.09	0.00	0.43	74
Stemsys cemented	RM Pressfit cup	64	142.1	0	0.00	0.00	2.60	18
Summit	ASR	88	741.0	36	4.86	3.40	6.73	0
Summit	Pinnacle	2248	13,418.1	101	0.75	0.61	0.91	185
Summit	Trilogy	168	1,286.5	6	0.47	0.17	1.02	11
Summit	Duraloc	101	1,212.1	5	0.41	0.13	0.96	0
Synergy Porous	BHR Acetabular Cup	114	1,034.2	40	3.87	2.76	5.27	0
Synergy Porous	R3 porous	1779	7,919.5	58	0.73	0.56	0.95	126

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2018
Synergy Porous	Reflection porous	1238	11,875.0	43	0.36	0.26	0.48	14
Synergy Porous	Delta-PF Cup	88	7,79.7	1	0.13	0.00	0.71	0
Synergy Porous	Continuum TM	55	120.5	0	0.00	0.00	3.06	6
Taperloc Complete	Continuum TM	108	101.1	3	2.97	0.61	8.67	63
Taperloc Complete	RM Pressfit cup	168	266.9	5	1.87	0.61	4.37	44
Taperloc Complete	G7 acetabular shell	259	390.5	6	1.54	0.56	3.34	96
Trabecular Metal Stem	Continuum TM	447	2,151.9	18	0.84	0.50	1.32	10
Trabecular Metal Stem	Monoblock Acetabular Cup	74	822.4	3	0.36	0.05	0.97	0
Tri-Lock BPS	Pinnacle	63	425.3	3	0.71	0.10	1.88	0
Twinsys cemented	Pinnacle	76	286.1	7	2.45	0.98	5.04	8
Twinsys cemented	Selexys TPS	65	458.4	5	1.09	0.35	2.55	0
Twinsys cemented	CCB	441	2,331.4	15	0.64	0.36	1.06	14
Twinsys cemented	RM Pressfit cup	1864	8557.7	42	0.49	0.35	0.66	197
Twinsys cemented	RM cup	148	1,464.9	5	0.34	0.09	0.75	0
Twinsys cemented	Continuum TM	108	408.7	1	0.24	0.01	1.36	6
Twinsys cemented	Reflection porous	59	174.7	0	0.00	0.00	2.11	9
Twinsys uncemented	Selexys TPS	1231	1,0413.9	136	1.31	1.10	1.54	0
Twinsys uncemented	RM cup	122	1,036.2	9	0.87	0.40	1.65	0
Twinsys uncemented	RM Pressfit cup	4855	29,448.8	191	0.65	0.56	0.75	241
Twinsys uncemented	Continuum TM	133	821.0	5	0.61	0.20	1.42	0
Twinsys uncemented	Trilogy	209	1,811.8	11	0.61	0.30	1.09	0
Twinsys uncemented	Delta-PF Cup	370	3,000.8	1	0.03	0.00	0.19	0
Versys	Trilogy	272	3,889.9	17	0.44	0.25	0.70	0
Versys cemented	ZCA	391	4,200.1	26	0.62	0.40	0.91	0
Versys cemented	Trilogy	237	2,636.1	7	0.27	0.11	0.55	0
Wagner cone stem	Fitmore	73	803.3	4	0.50	0.14	1.27	1

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

Size	Surfaces	No. Ops.	Observed comp. yrs.	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=28	CC	777	8,017.0	59	0.74	0.56	0.95
<=28	CM	48	196.0	3	1.53	0.21	4.09
<=28	CP	11,780	11,081.8	750	0.68	0.63	0.73
<=28	MM	2,999	39,640.3	306	0.77	0.69	0.86
<=28	MP	46,332	437,788.4	3,109	0.71	0.69	0.74
32	CC	3,800	30,548.7	167	0.55	0.47	0.63
32	CP	14,155	53,919.0	297	0.55	0.49	0.62
32	MM	480	4,816.0	42	0.87	0.63	1.18
32	MP	29,256	136,243.4	798	0.59	0.55	0.63
36	CC	7,352	46,365.5	266	0.57	0.51	0.65
36	CM	443	3,657.0	27	0.74	0.49	1.07
36	CP	6,553	22,930.6	145	0.63	0.53	0.74
36	MM	1,002	10,398.2	129	1.24	1.04	1.47
36	MP	3,940	15,308.0	111	0.73	0.60	0.87
>36	CC	1,835	8,735.1	44	0.50	0.36	0.67
>36	CM	7	62.5	0	0.00	0.00	5.90
>36	CP	7	19.1	0	0.00	0.00	19.34
>36	MM	1,648	14,787.0	550	3.72	3.42	4.04
>36	MP	34	185.3	1	0.54	0.00	3.01

Summary Revision Rates vs Head Size

Size	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=28	61,936	596,423.4	4,227	0.71	0.69	0.73
32	47,691	225,527.1	1,304	0.58	0.55	0.61
36	19,290	98,659.4	678	0.69	0.64	0.74
>36	3,531	23,789.1	595	2.50	2.30	2.71

Revision Comparison Standard vs Cross linked Polyethylene

Surfaces	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	13,783	93,689.5	536	0.57	0.52	0.62
CM	500	3,919.1	30	0.77	0.52	1.09
CP	32,551	187,712.9	1,193	0.64	0.60	0.67
PS	7,025	80,720.8	618	0.77	0.71	0.83
PX	25,526	106,992.1	575	0.54	0.49	0.58
MM	6,135	69,665.7	1,029	1.48	1.39	1.57
MP	79,578	589,627.2	4,019	0.68	0.66	0.70
PS	36,988	353,017.5	2,699	0.76	0.74	0.79
PX	42,590	236,609.8	1,320	0.56	0.53	0.59

Revision vs Bearing Surfaces of Uncemented Prostheses

Surfaces	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	10,789	74,417.0	445	0.60	0.54	0.66
CM	480	3,877.6	29	0.75	0.49	1.06
CP	21,537	118,993.5	763	0.64	0.60	0.69
MM	5,389	62,074.4	938	1.51	1.42	1.61
MP	15,840	106,188.0	808	0.76	0.71	0.81

Revision vs Bearing Surfaces of Fully Cemented Prostheses

Surfaces	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CP	751	6,039.9	47	0.78	0.57	1.03
MM	7	59.7	2	3.35	0.41	12.11
MP	24,616	208,386.6	1,355	0.65	0.62	0.69

Revision vs Bearing Surfaces of Hybrid Prostheses

Surfaces	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	2,994	19,272.5	91	0.47	0.38	0.58
CM	20	41.4	1	2.41	0.06	13.44
CP	10,263	62,679.5	383	0.61	0.55	0.67
MM	739	7,531.6	89	1.18	0.95	1.45
MP	39,122	275,052.6	1,856	0.67	0.64	0.71

Summary for Revision vs Bearing Surfaces

Surfaces	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	13,783	93,689.5	536	0.57	0.52	0.62
CM	500	3,919.1	30	0.77	0.52	1.09
CP	32,551	187,712.9	1,193	0.64	0.60	0.67
MM	6,135	69,665.7	1,029	1.48	1.39	1.57
MP	79,578	589,627.2	4,019	0.68	0.66	0.70

Revision vs Bearing Surface Options for 6 Acetabulae in common use

		No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
RM Pressfit cup	M	333	3,252.3	24	0.74	0.47	1.10
	PS	6,131	41,856.2	240	0.57	0.50	0.65
	PX	5,521	19,049.0	100	0.52	0.43	0.64
	P	11,652	60,905.2	340	0.56	0.50	0.62
Pinnacle	C	3,247	19,344.0	104	0.54	0.44	0.65
	M	1,525	15,150.8	174	1.15	0.98	1.33
	PS	24	149.8	2	1.34	0.16	4.82
	PX	13,796	56,707.2	342	0.60	0.54	0.67
	P	13,820	56,857.0	344	0.61	0.54	0.67
R3 porous	C	991	5,087.2	17	0.33	0.19	0.54
	M	110	817.0	49	6.00	4.44	7.93
	P	3,700	13,084.5	80	0.61	0.48	0.76
Trident	C	2,482	24,687.3	112	0.45	0.37	0.54
	M	100	188.6	3	1.59	0.22	4.24
	PS	1	12.9	0	0.00	0.00	28.56
	PX	12,134	75,687.3	385	0.51	0.46	0.56
	P	12,135	75,700.2	385	0.51	0.46	0.56
Tritanium	C	108	541.0	1	0.18	0.00	1.03
	M	135	343.8	5	1.45	0.47	3.39
	P	4,603	17,068.2	110	0.64	0.53	0.77
Trilogy	C	69	884.3	5	0.57	0.18	1.32
	M	5	57.8	0	0.00	0.00	6.38
	PS	158	2,269.3	14	0.62	0.34	1.04
	PX	6,084	46,248.0	241	0.52	0.46	0.59
	P	6,242	48,517.3	255	0.53	0.46	0.59

Revision vs Monoblock Femoral Stems

No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1,297	15,165	79	0.52	0.41	0.65

Revision vs Acetabulum type

Acetabulum type	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	25,877	218,465.4	1,444	0.66	0.63	0.70
Uncemented Liner	85,841	567,381.6	4,025	0.71	0.69	0.73
Uncemented No Liner	20,829	158,767.4	1,338	0.84	0.80	0.89

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	19,673	161,726.1	1,688	1.04	0.99	1.09
55-64	33,927	264,056.1	2,212	0.84	0.80	0.87
65-74	45,626	330,429.4	2,051	0.62	0.59	0.65
>=75	36,235	2159,26.1	1,014	0.47	0.44	0.50

Revision vs Age Bands vs Bearing Surfaces

Bearing Surface	Age Bands	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
CC	<55	5,348	36,576.0	238	0.65	0.57	0.74
	55-64	5,579	38,901.2	194	0.50	0.43	0.57
	65-74	2,598	16,809.8	97	0.58	0.47	0.70
	>=75	258	1,402.6	7	0.50	0.20	1.03
CM	<55	192	1,513.6	11	0.73	0.36	1.30
	55-64	212	1,720.0	15	0.87	0.49	1.44
	65-74	79	599.0	4	0.67	0.18	1.71
	>=75	17	86.5	0	0.00	0.00	4.26
CP	<55	6,146	39,884.0	343	0.86	0.77	0.95
	55-64	11,380	68,720.8	433	0.63	0.57	0.69
	65-74	10,832	59,888.4	305	0.51	0.45	0.57
	>=75	4,193	19,219.7	112	0.58	0.48	0.70
MM	<55	2,890	35,582.5	497	1.40	1.28	1.53
	55-64	2,394	26,778.9	437	1.63	1.48	1.79
	65-74	705	6,725.6	85	1.26	1.01	1.56
	>=75	146	578.6	10	1.73	0.83	3.18
MP	<55	4,828	4,4793.6	563	1.26	1.16	1.37
	55-64	13,839	122,050.0	1,096	0.90	0.85	0.95
	65-74	30,352	235,623.5	1,503	0.64	0.61	0.67
	>=75	30,559	187,160.2	857	0.46	0.43	0.49

Revision vs Gender

Sex	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
F	72,430	518,181.5	3,350	0.65	0.62	0.67
M	63,031	453,956.2	3,615	0.80	0.77	0.82

Revision vs Surgeon Annual Workload

Operations per Year	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	1,758	14,119.5	141	1.00	0.84	1.18
10-24	14,131	105,567.4	792	0.75	0.70	0.80
25-49	56,040	406,873.9	3,126	0.77	0.74	0.80
50-74	32,520	220,913.2	1,395	0.63	0.60	0.67
75-99	18,403	114,801.5	711	0.62	0.57	0.67
>=100	12,609	109,862.3	800	0.73	0.68	0.78

Revision vs Approach

Approach	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Anterior	4,461	38,954.9	303	0.78	0.69	0.87
Posterior	89,189	619,297.7	4,481	0.72	0.70	0.74
Lateral	32,813	255,564.6	1,692	0.66	0.63	0.69
Troch	215	1,692.6	23	1.36	0.86	2.04

Revision vs Arthroplasty Fixation

Fixation	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	27,185	231,428.4	1,500	0.65	0.62	0.68
Uncemented	54,566	370,016.9	3,009	0.81	0.78	0.84
Hybrid	53,710	370,692.4	2,456	0.66	0.64	0.69

Revision by Arthroplasty Fixation vs Age Bands

Age Bands	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented						
<55	752	7,713.8	150	1.94	1.64	2.27
55-64	2,611	28,271.1	325	1.15	1.03	1.28
65-74	9,321	92,394.6	642	0.69	0.64	0.75
>=75	14,501	103,048.8	383	0.37	0.34	0.41
Uncemented						
<55	14,663	115,428.0	1,082	0.94	0.88	0.99
55-64	19,793	139,086.2	1,162	0.84	0.79	0.88
65-74	14,647	88,291.5	564	0.64	0.59	0.69
>=75	5,463	27,211.2	201	0.74	0.64	0.85
Hybrid						
<55	4,258	38,584.2	456	1.18	1.08	1.30
55-64	11,523	96,698.7	725	0.75	0.70	0.81
65-74	21,658	149,743.4	845	0.56	0.53	0.60
>=75	16,271	85,666.1	430	0.50	0.46	0.55

Revision vs ASA Status

ASA Class	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
1	16,223	101,430.6	729	0.72	0.67	0.77
2	60,350	340,925.2	2,154	0.63	0.61	0.66
3	24,203	117,082.3	801	0.68	0.64	0.73
4	879	3,027.7	32	1.06	0.71	1.47

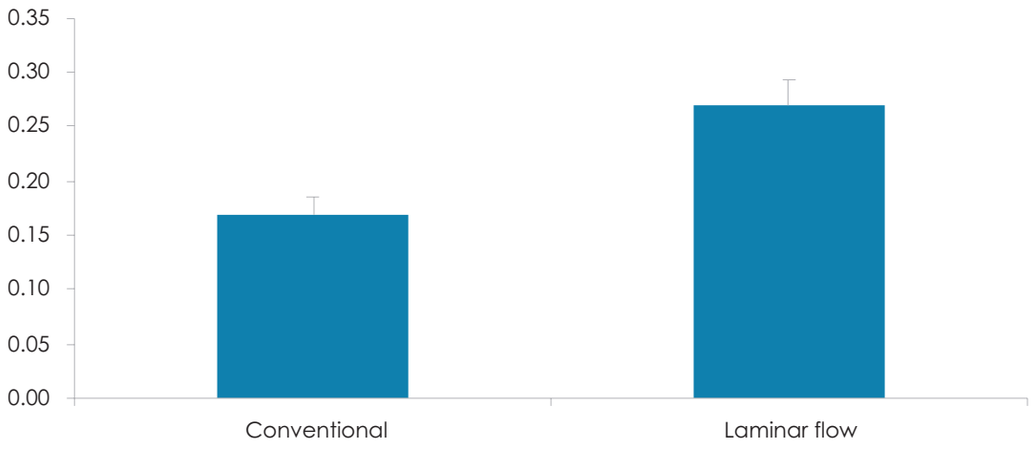
Revision vs BMI Status

BMI	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
< 19	514	1,678.1	15	0.89	0.48	1.44
19 - 24	10,281	37,506.3	210	0.56	0.49	0.64
25 - 29	18,752	68,315.6	381	0.56	0.50	0.62
30 - 39	17,752	62,730.8	415	0.66	0.60	0.73
40+	1,928	6,342.0	71	1.12	0.87	1.41

Revision for Deep Infection within six months vs Theatre Environment

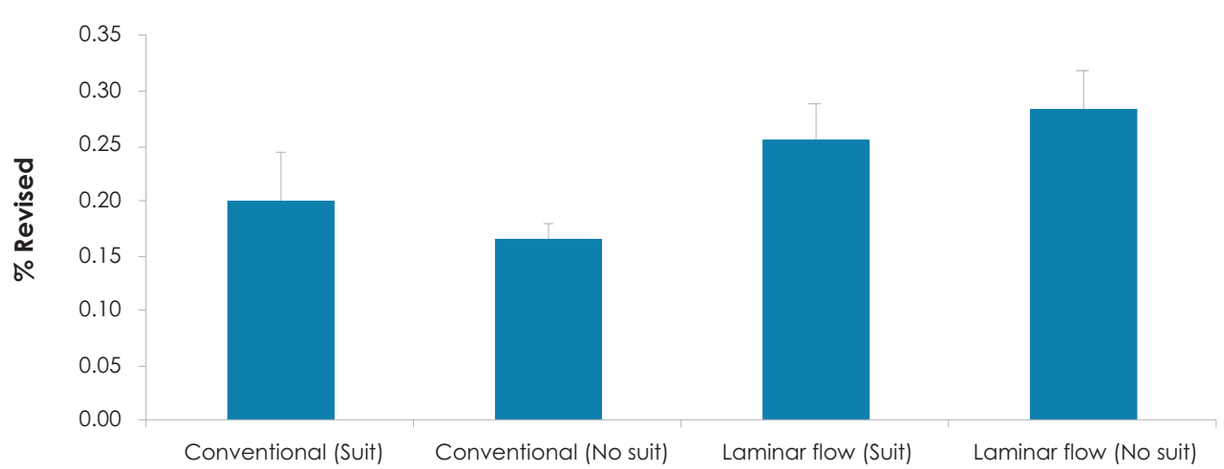
Theatre	Total Number	Number revised	%	Standard error
Conventional	79,409	135	0.170	0.0146
Laminar flow	48,214	130	0.270	0.0236

% Revision for Deep infection within 6 months



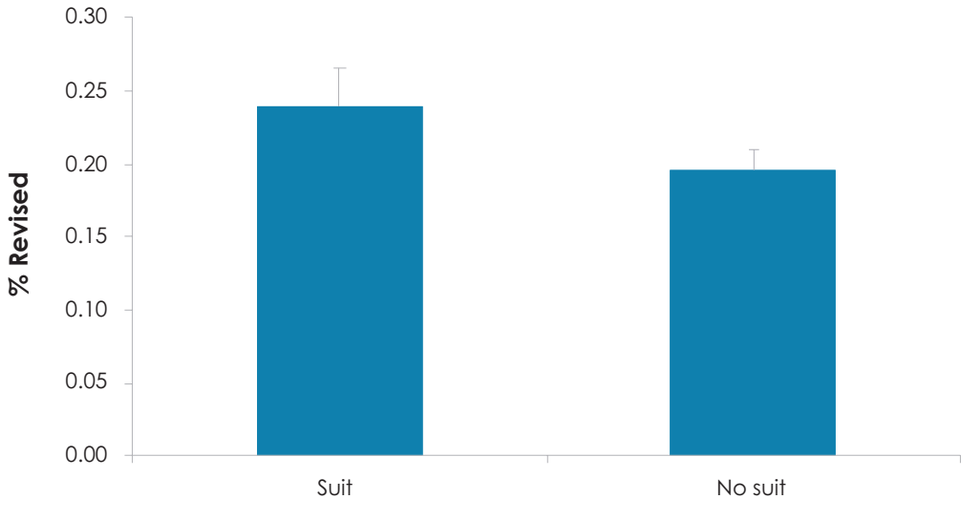
		Total Number	Number revised	%	Standard error
Conventional	Suit	10,971	22	0.201	0.043
	no suit	68,438	113	0.165	0.016
Laminar flow	Suit	24,975	64	0.256	0.032
	no suit	23,239	66	0.284	0.035

% Revision for Deep infection within 6 months

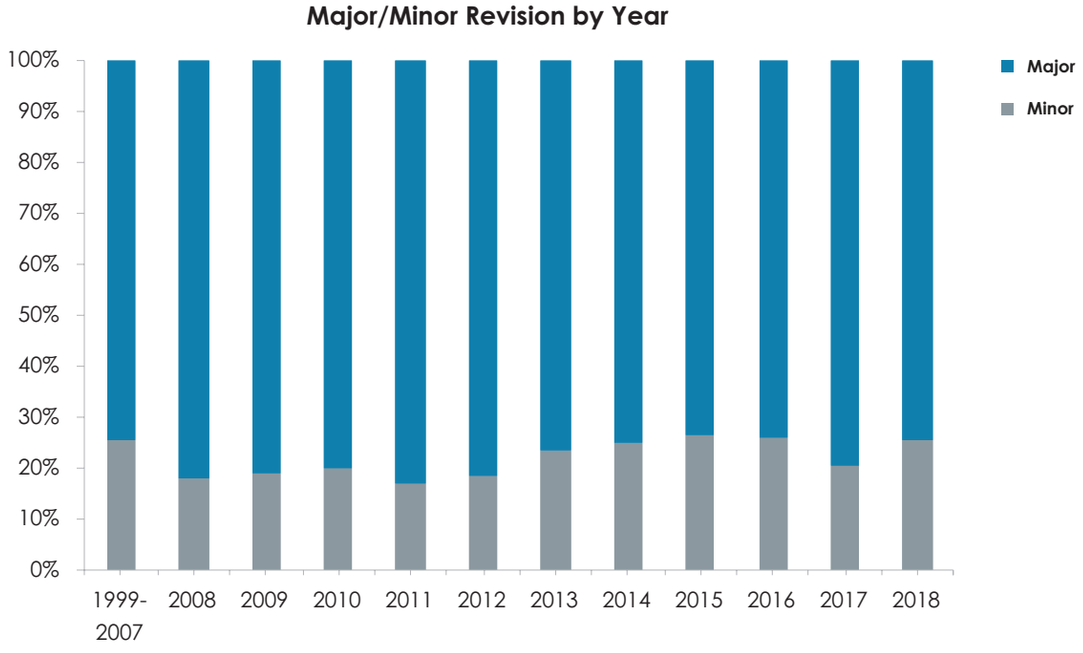


	Total Number	Number revised	%	Standard error
Suit	35,946	86	0.24	0.026
No suit	91,677	179	0.20	0.015

% Revision for Deep infection within 6 months



Comparison of Major vs Minor Revisions by Year

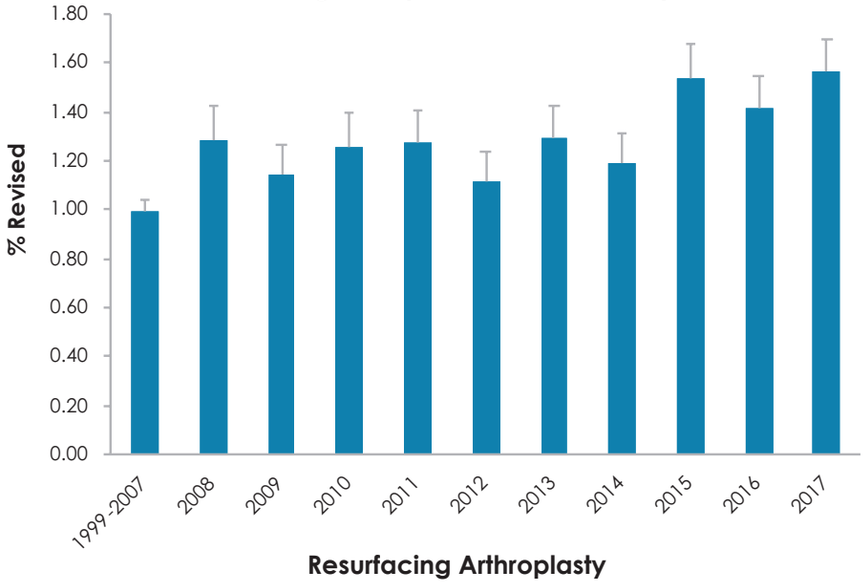


A major revision is defined as revision of acetabulum and/or femur including any of minor components and minor revision as change of head and/or liner only.

Re-revisions for Major vs Minor Revisions

	No. Ops	Observed comp. yrs	Number Re-revised	Rate/100 component-years	Exact 95% confidence interval	
Minor	1,579	6,395.0	276	4.32	3.82	4.86
Major	5,349	22,431.4	730	3.25	3.02	3.50

Percentage of hips revised in the first year



Resurfacing Arthroplasty

No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
1,877	14,163.3	150	1.06	0.90	1.24

Resurfacing Prosthesis vs Revision Rate

Prosthesis	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Adept	4	43.1	0	0.00	0.00	8.56
ASR	132	1,346.7	41	3.04	2.18	4.13
BHR	1,694	12,391.0	102	0.82	0.67	1.00
BMHR	28	216.8	1	0.46	0.01	2.57
Conserve Superfinish	3	28.6	0	0.00	0.00	12.90
Durom	4	56.5	0	0.00	0.00	6.52
Mitch TRH Resurfacing Head	12	80.6	6	7.45	2.73	16.20

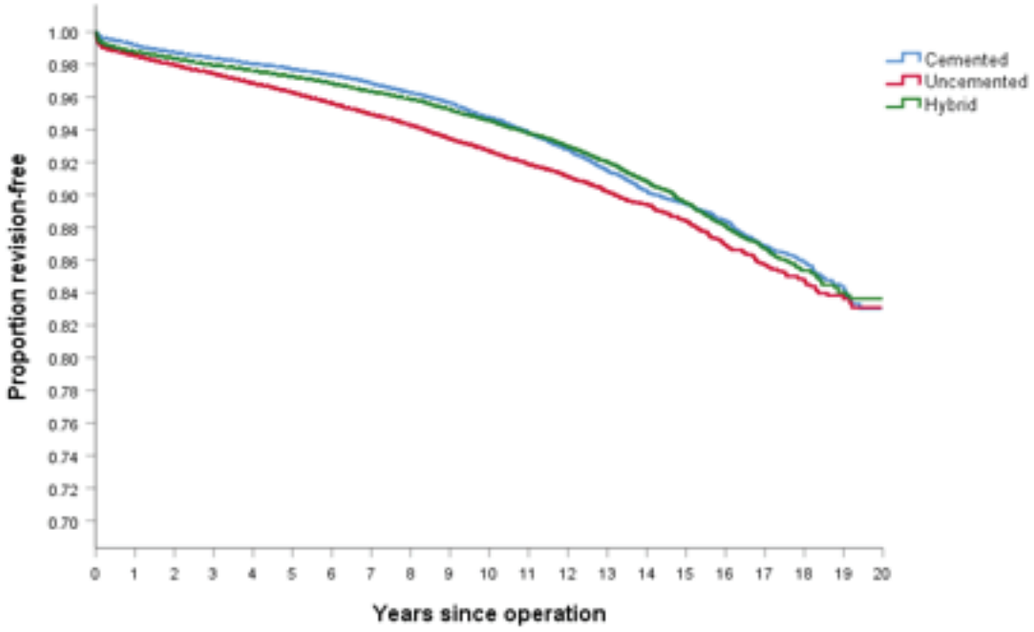
Head size vs Revision Rate

Head size	No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<=44	99	834.7	33	3.95	2.72	5.55
45-49	358	3,000.1	49	1.63	1.21	2.16
50-54	1,327	9,455.9	59	0.62	0.47	0.80
>=55	93	872.6	9	1.03	0.47	1.96

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 20 years 1999 – 2018 with deceased patients censored at time of death.

Years	% Revision-free	No. in each year
1	98.77	122,849
2	98.29	111,678
3	97.83	100,972
4	97.40	90,655
5	96.96	80,576
6	96.46	71,222
7	95.89	62,423
8	95.32	54,129
9	94.62	46,145
10	93.85	38,815
11	93.02	32,295
12	92.16	26,298
13	91.12	21,011
14	90.05	16,215
15	88.97	11,969
16	87.67	8,560
17	86.29	5,727
18	85.18	3,377
19	83.85	1,405



Cemented

Years	% Revision-free	No in each year
1	99.19	25,384
2	98.74	23,987
3	98.39	22,459
4	98.04	20,703
5	97.71	18,894
6	97.36	17,136
7	96.85	15,333
8	96.26	13,595
9	95.66	12,054
10	94.75	10,559
11	93.80	9,088
12	92.77	7,636
13	91.50	6,235
14	90.28	4,927
15	89.42	3,745
16	88.40	2,766
17	86.87	1,907
18	85.89	1,160
19	84.37	531

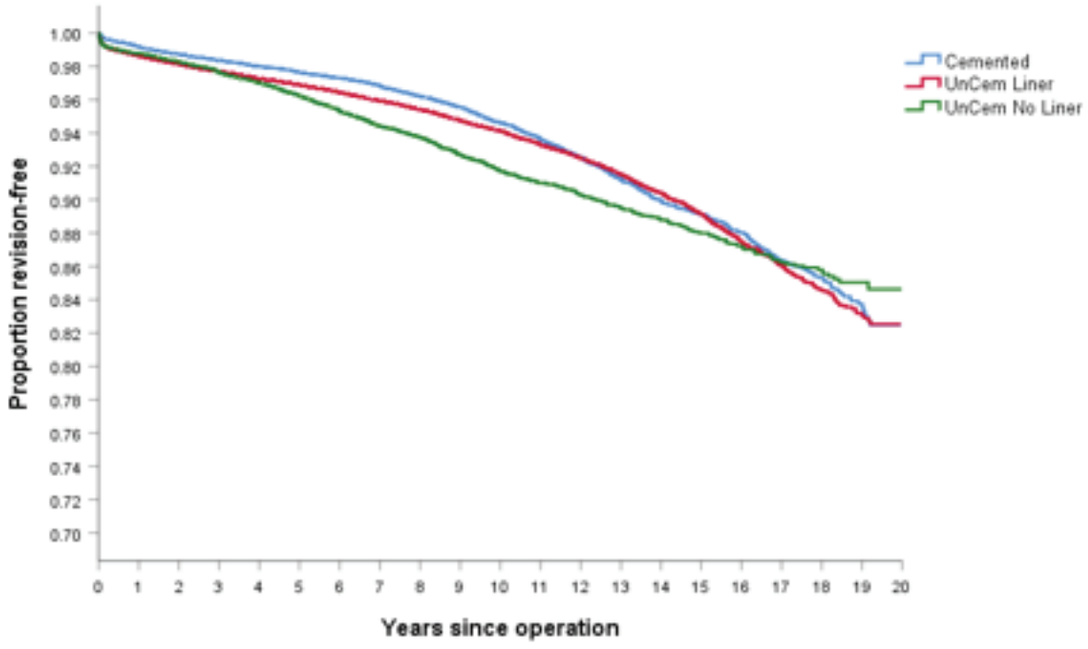
Uncemented

Years	% Revision-free	No in each year
1	98.54	49,189
2	97.98	44,314
3	97.43	39,856
4	96.84	35,603
5	96.28	31,503
6	95.61	27,649
7	94.95	24,117
8	94.28	20,653
9	93.44	16,985
10	92.69	13,625
11	91.88	10,875
12	91.11	8,547
13	90.19	6,599
14	89.41	4,988
15	88.40	3,638
16	86.94	2,539
17	85.71	1,674
18	84.75	981
19	83.62	404

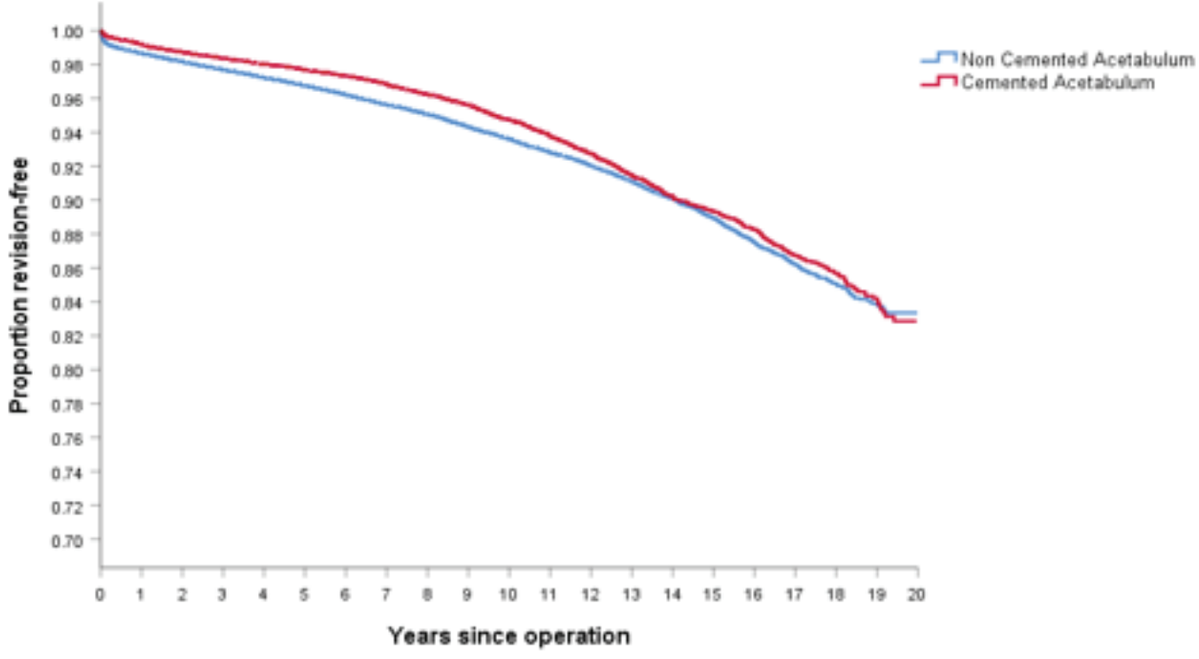
Hybrid

Years	% Revision-free	No in each year
1	98.80	48,276
2	98.37	43,377
3	97.96	38,657
4	97.64	34,349
5	97.26	30,179
6	96.84	26,437
7	96.34	22,973
8	95.87	19,881
9	95.25	17,106
10	94.55	14,631
11	93.78	12,332
12	92.97	10,115
13	92.01	8,177
14	90.82	6,300
15	89.49	4,586
16	88.10	3,255
17	86.70	2,146
18	85.35	1,236
19	84.03	470

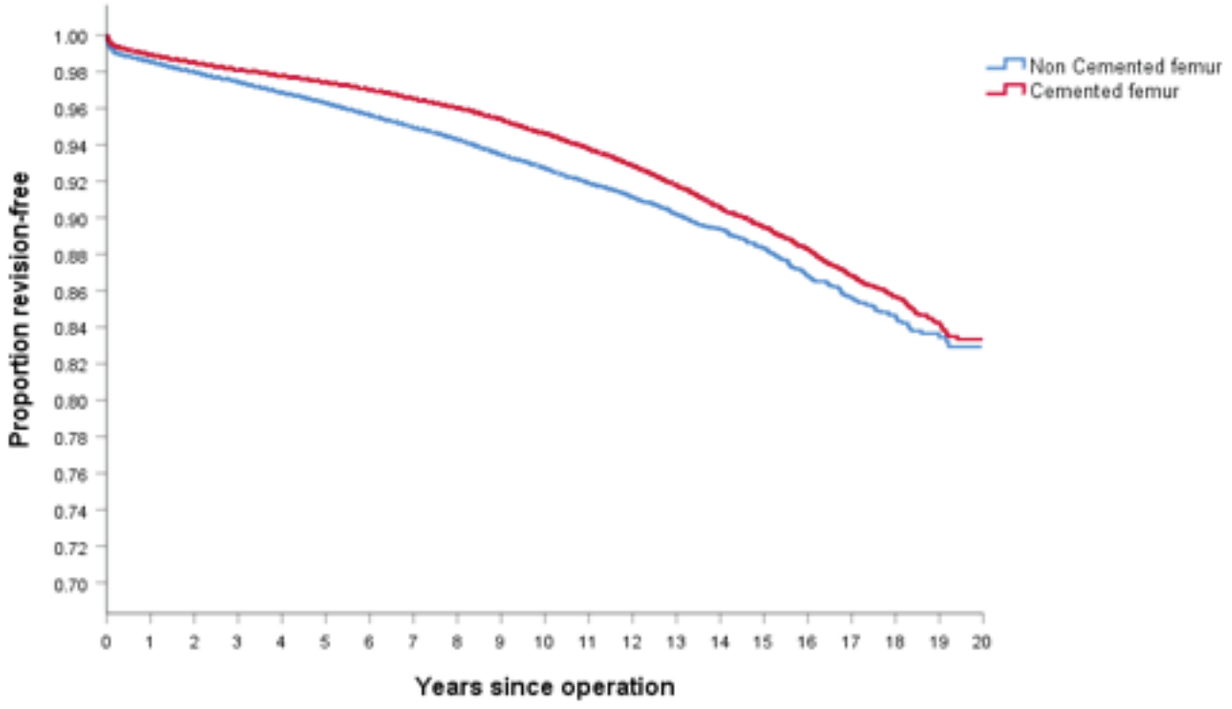
Survival of Cemented vs Uncemented no Liner vs Uncemented with Liner



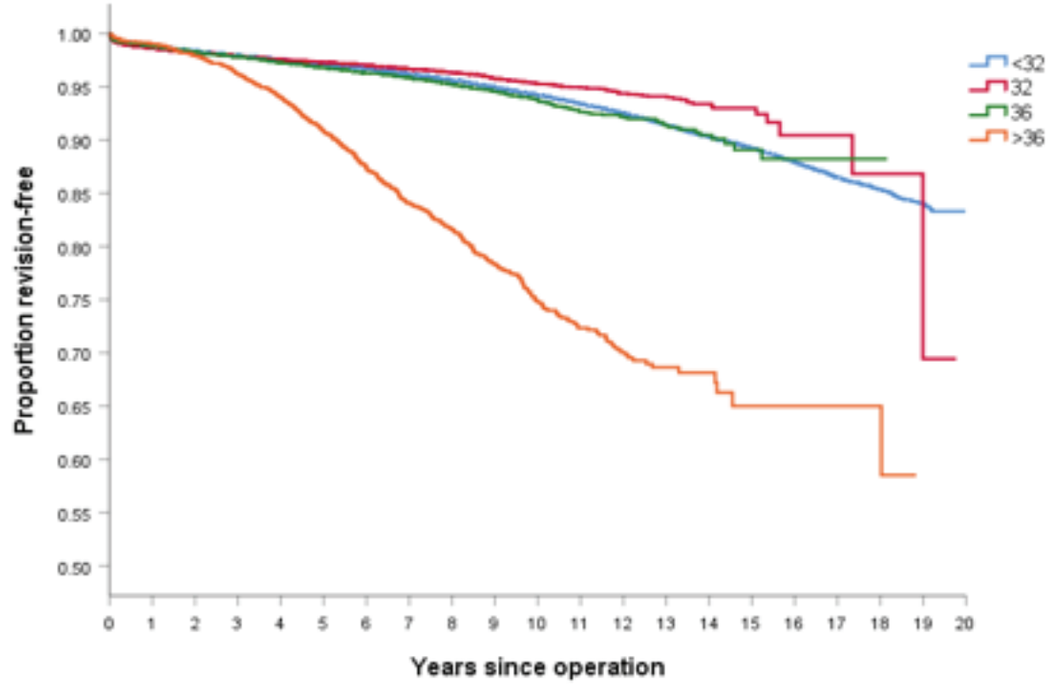
Survival of Cemented vs Uncemented Acetabulae



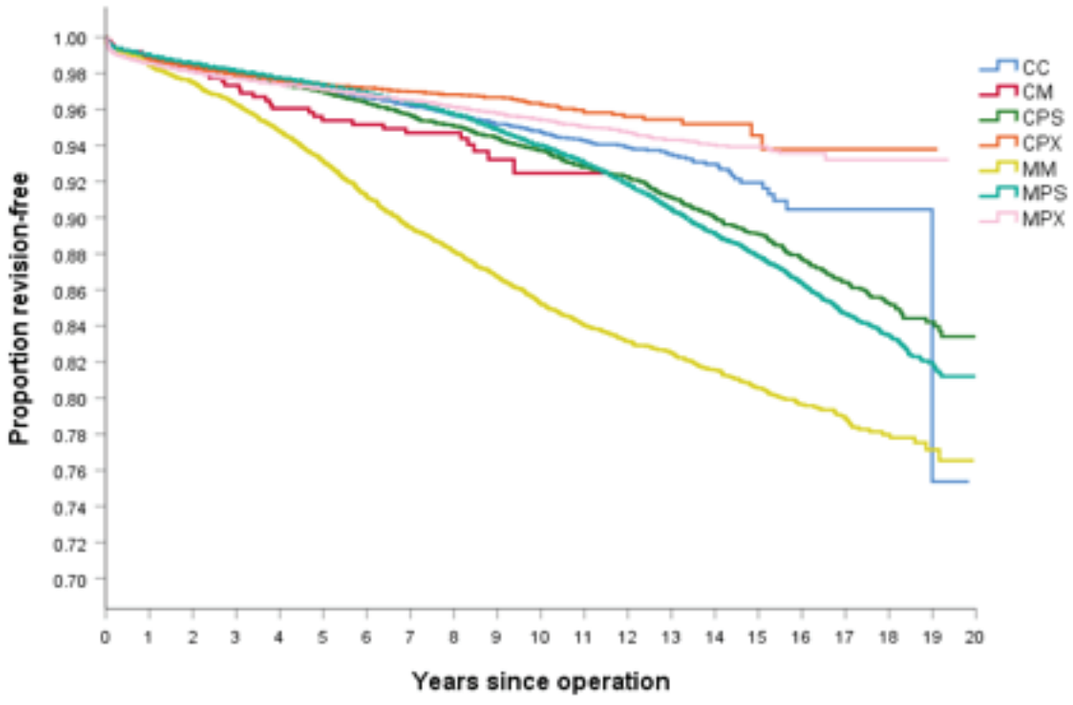
Survival of Cemented vs Uncemented Femoral components



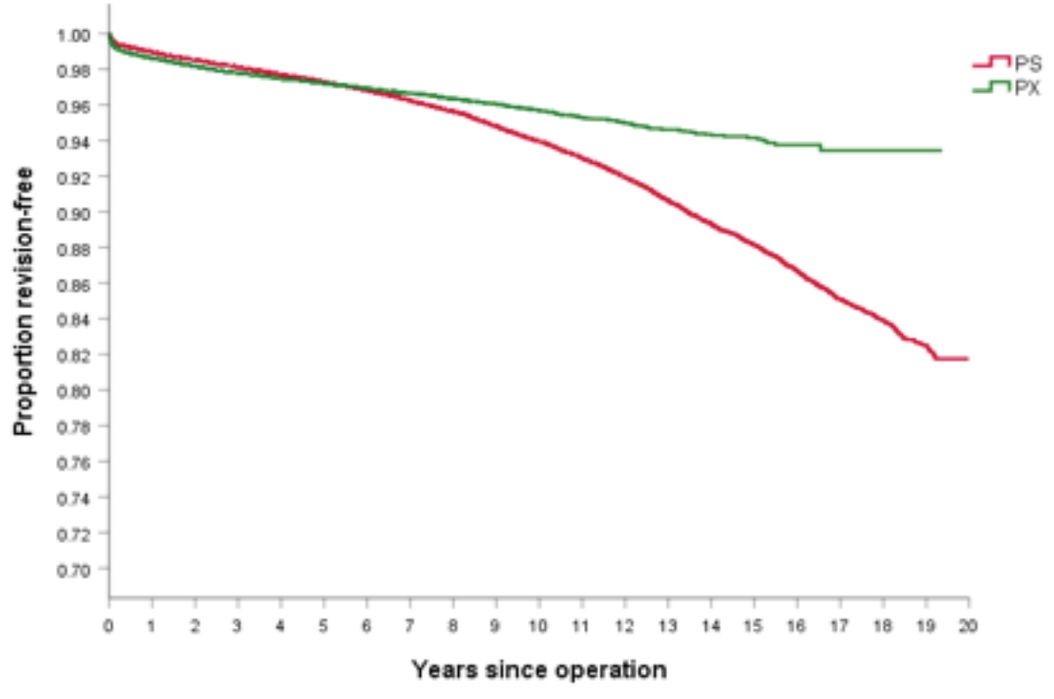
Survival of Head Sizes



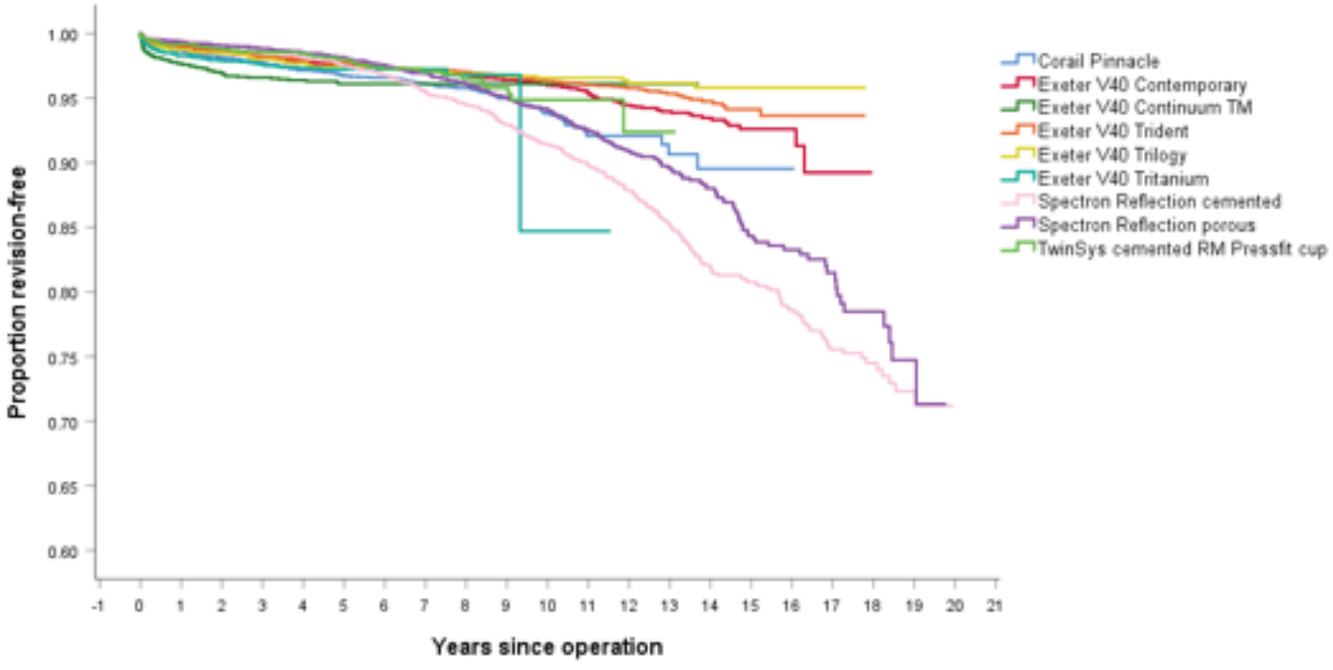
Survival of Bearing Surfaces



Survival of Crosslinked vs Standard polyethylene

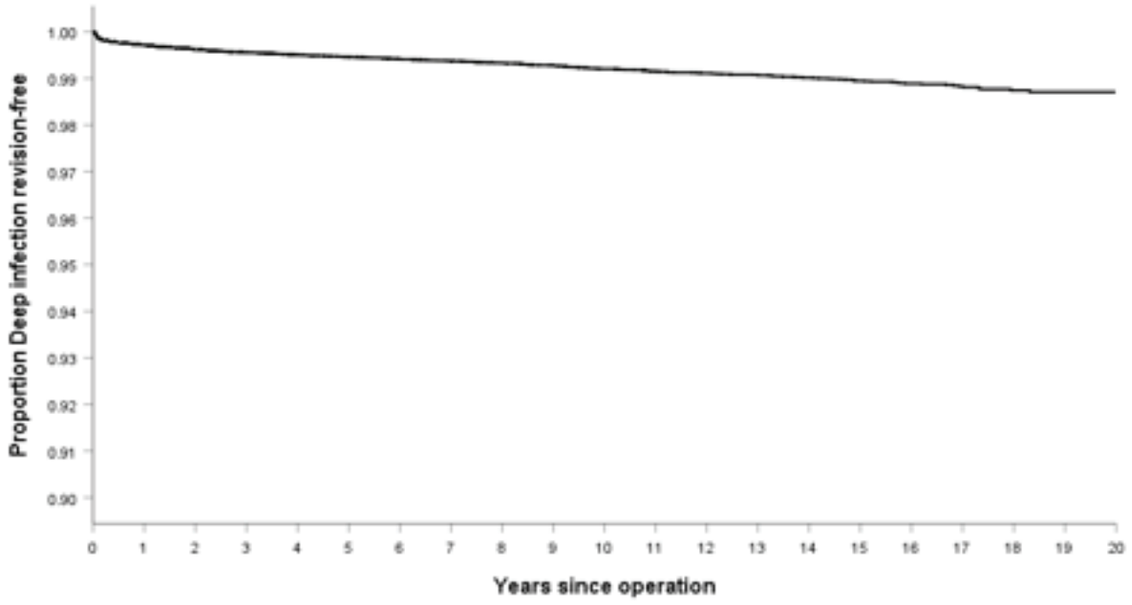


Survival of combinations with > 2500 procedures

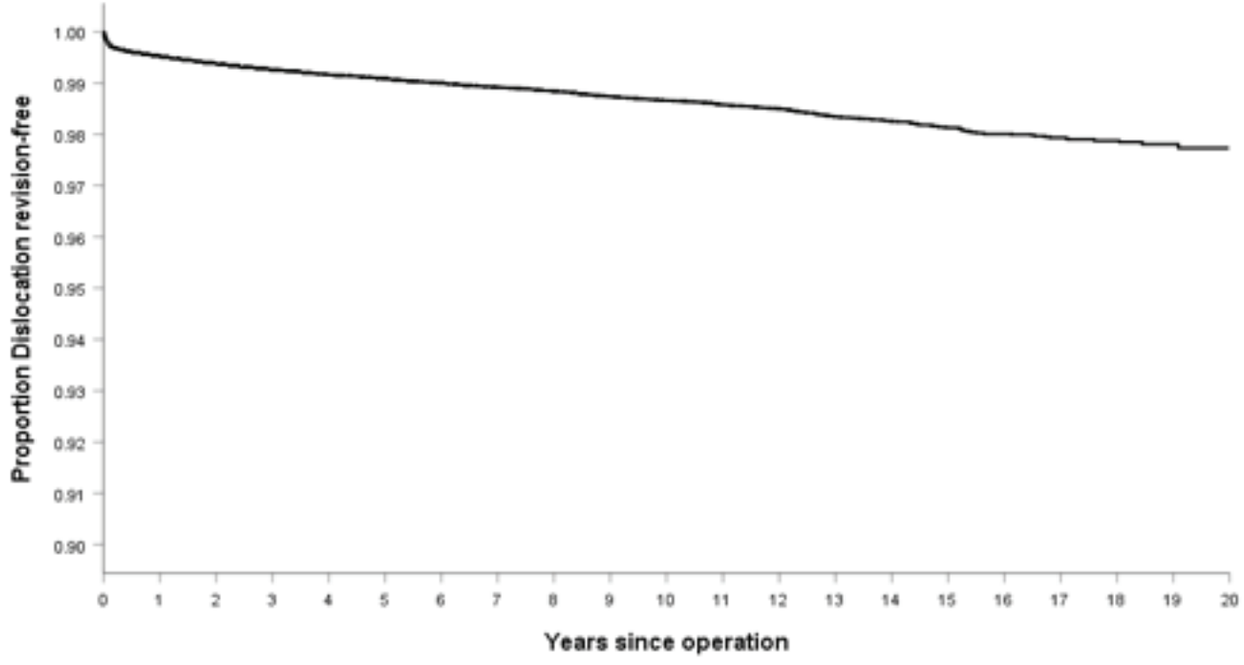


The following K M graphs are for the six main individual reasons for revision:

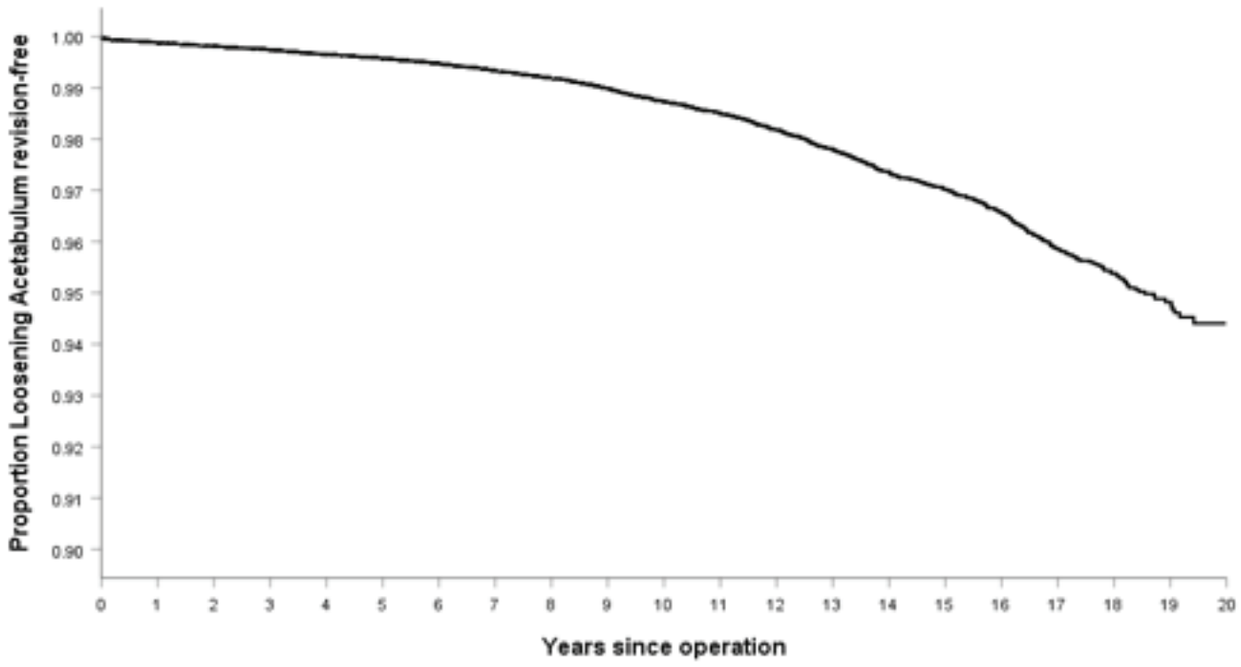
Deep infection



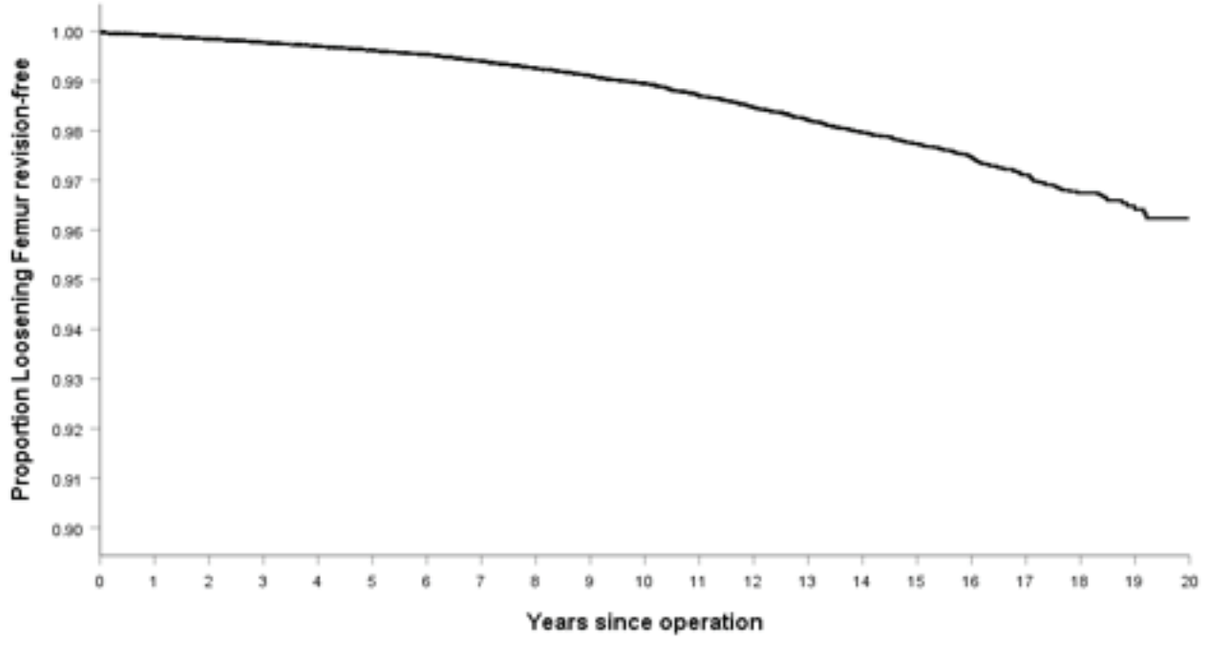
Dislocation



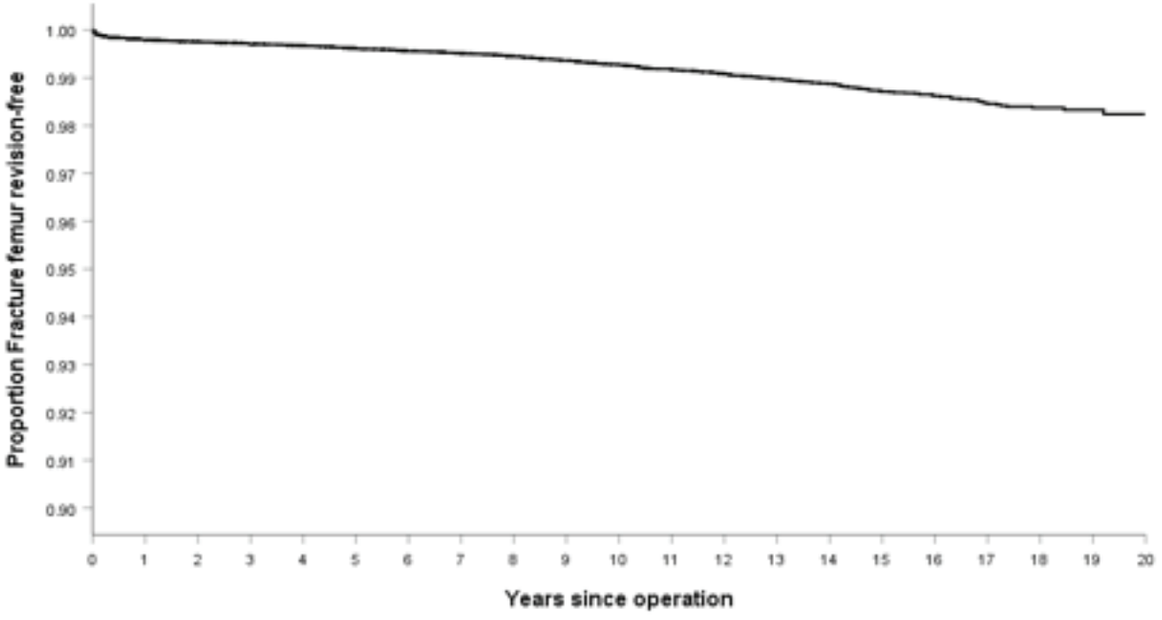
Loosening acetabular component



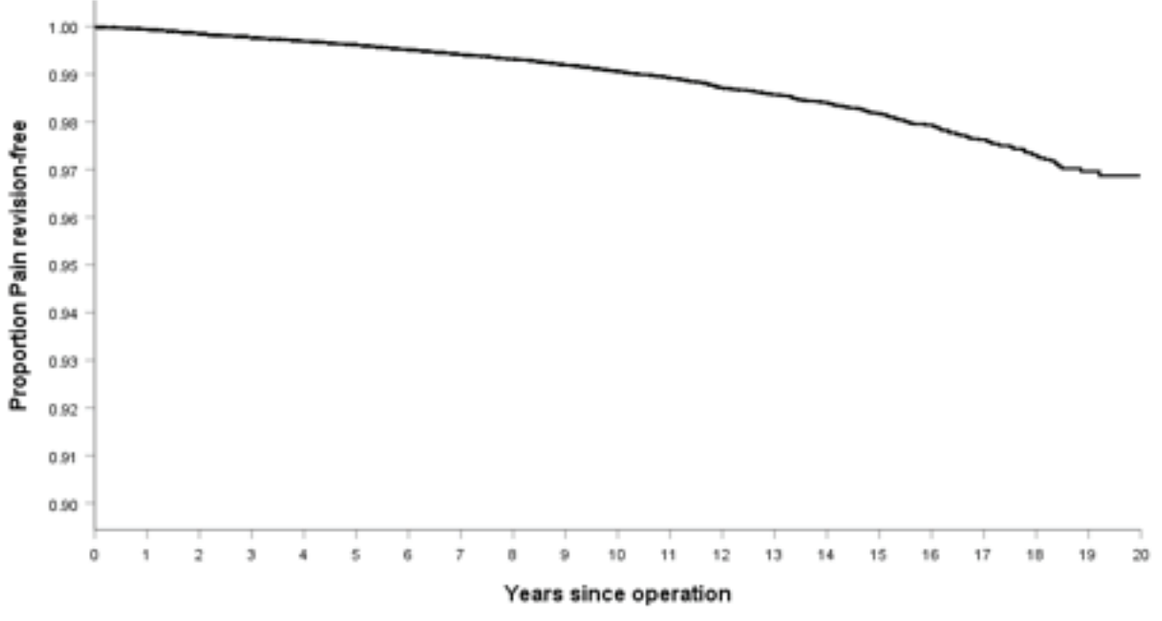
Loosening femoral component



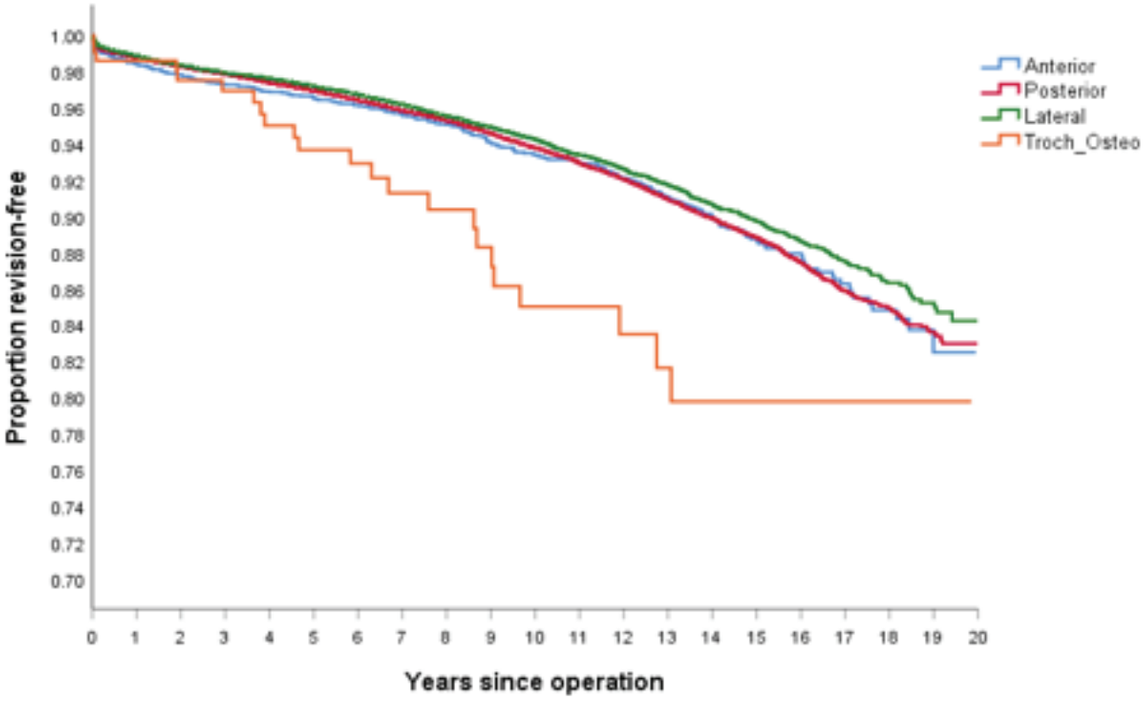
Fracture femur



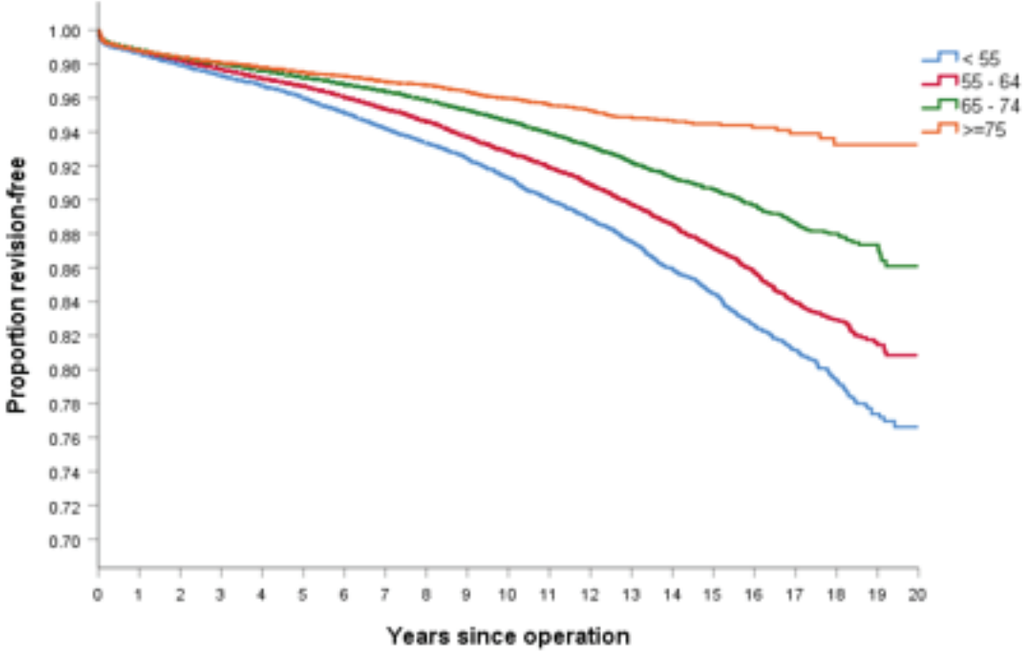
Pain



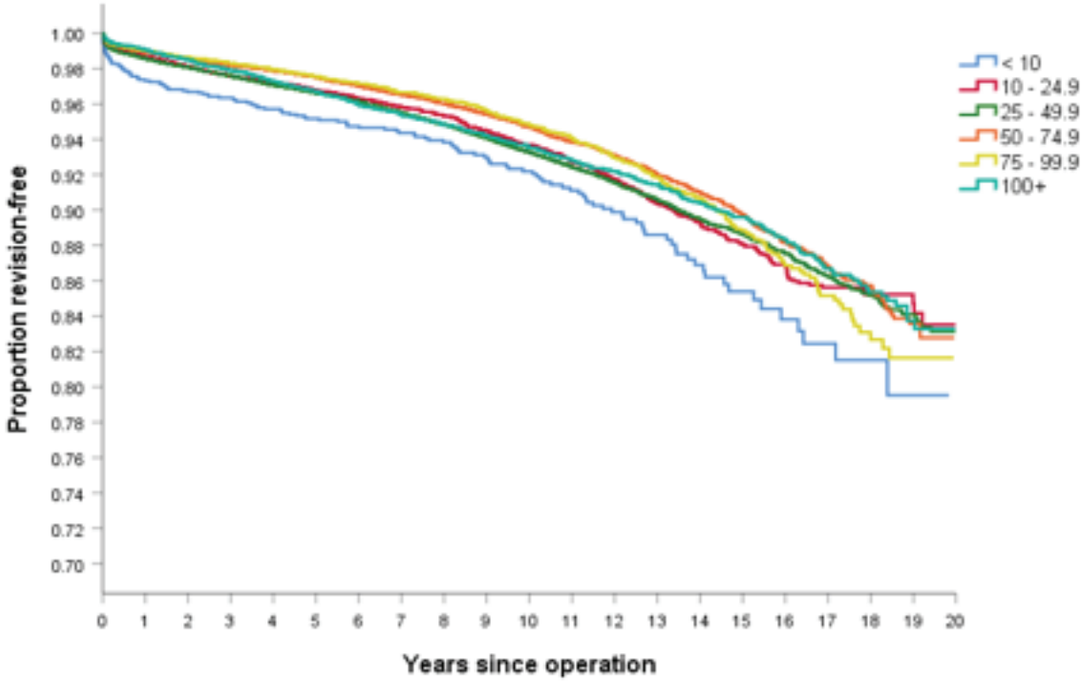
Survival for surgical approach



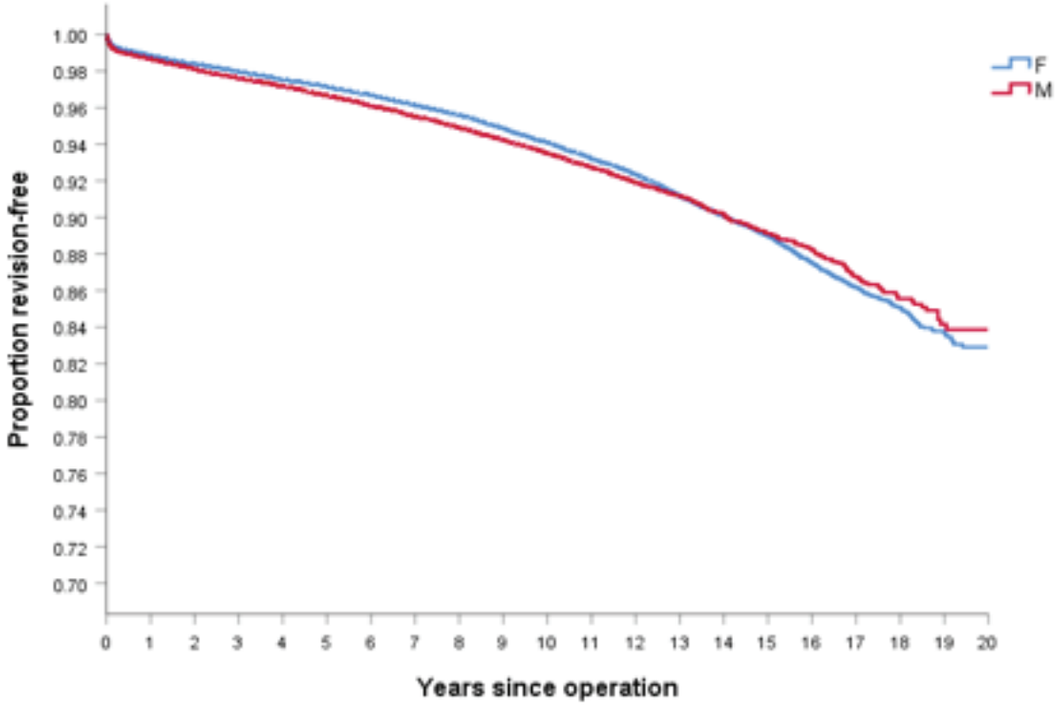
Survival for age bands



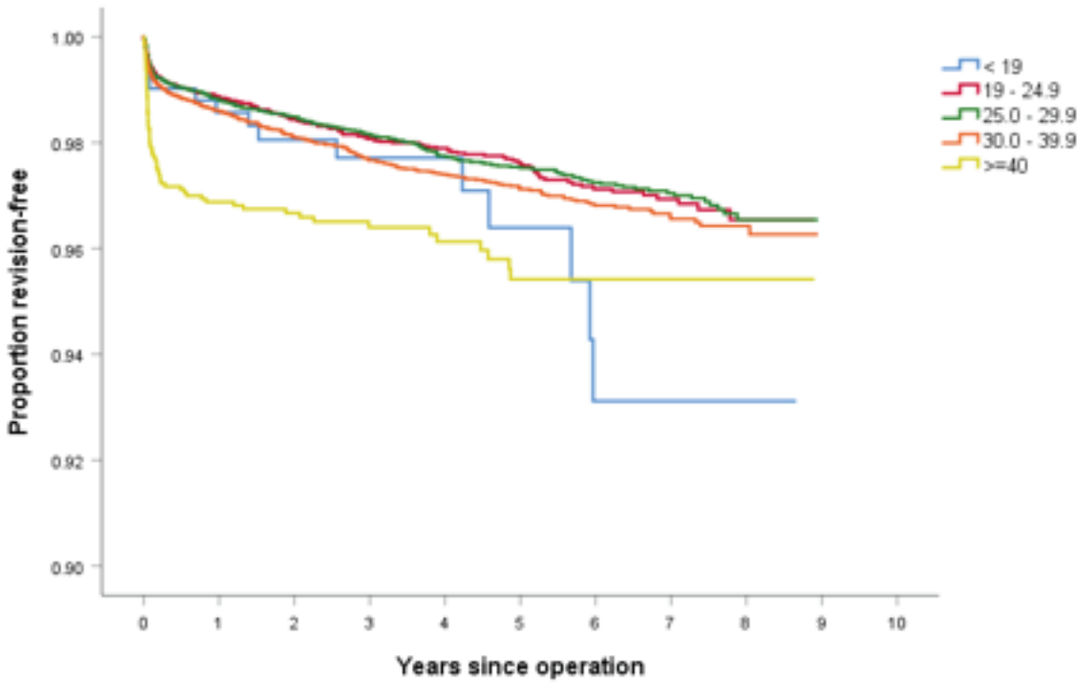
Survival for surgeon annual output



Survival male vs female



Survival vs BMI



Re-revisions of conventional hips

Analyses were undertaken of hip re-revisions.

There were 1,010 registered conventional hip replacements that had been revised twice, 238 that had been revised three times, 65 that had been revised four times, 20 that had been revised 5 times and 7 that had been revised 6 times. There was 1 patient who has now had 12 revisions.

Second revision

Time between the first and second revisions averaged 864 days, with a range of 0 – 6,257 and a standard deviation of 1,139. This compares to an average of 2,137 days between the primary and first revision.

Reason for revision

Deep infection	305
Dislocation	285
Loosening femoral component	123
Loosening acetabulum component	123
Pain	97
Fracture femur	75

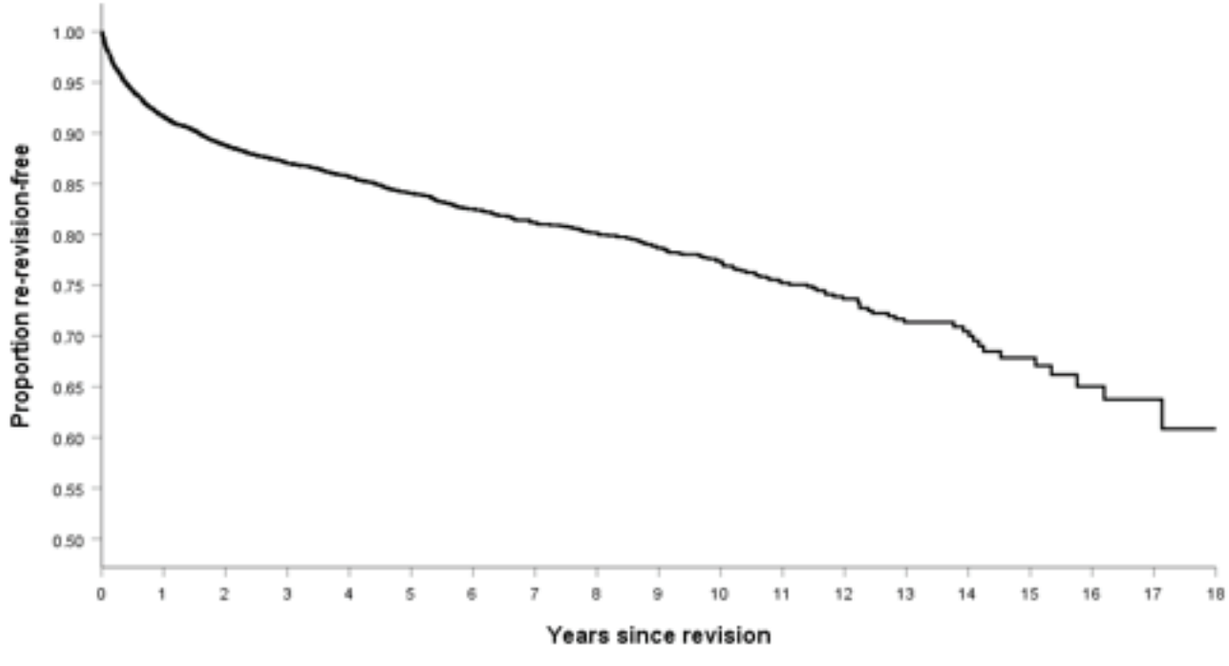
Revision

Change of head	677
Change of liner	462
Change of acetabulum	278
Change of femoral	285
Change of all	268

Re-revisions

No. Ops	Observed comp. yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
6,965	29,075	1,010	3.47	3.26	3.69

Years	Percentage re-revision free	No. in each year
1	91.60	5,162
2	88.80	4,377
3	87.00	3,684
4	85.70	3,090
5	84.10	2,515
6	82.50	1,992
7	81.20	1,520
8	80.10	1,179
9	78.70	899
10	77.40	658
11	75.20	470
12	73.70	338
13	71.30	226
14	70.50	153
15	67.80	91



Third revision

The average time between second and third revisions for the 238 arthroplasties was 613 days with a range of 1 – 4,451 and a standard deviation of 829.

Fourth revision

There were n = 65 registered with 4 revisions.

Fifth revision

There were 20 registered 5 revisions.

Sixth revision

There were 7 registered with 6 revisions.

One patient has had n = 12 revisions.

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

Re- revisions of resurfacing hip replacements

There have been 35 re-revisions.

The average time between the first and second revisions was 806 days, with a range of 11 – 3,036 and a standard deviation of 962. This compares with an average of 2,016 days between the primary resurfacing and the first revision.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS, TEN YEARS, FIFTEEN YEARS AND TWENTY 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.

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 twenty- year period, and as at July 2019, there were 32,754 primary hip questionnaire responses registered six months post-surgery. The average hip score was 40.39 (standard deviation 7.60, range 48 – 0).

Scoring	> 41	18,450
Scoring	34 -41	9,029
Scoring	27 -33	3,144
Scoring	< 27	2,131

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 12,115 individual patients.

At five years post-surgery, 89% of these patients achieved an excellent or good score and had an average of 42.40.

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 8,164 individual patients.

At ten years post-surgery, 87% of these patients achieved an excellent or good score and had an average of 41.91.

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 3,170 individual patients.

At fifteen years post-surgery, 86% of these patients achieved an excellent or good score and had an average of 41.50.

Questionnaires at twenty 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 20 years post-surgery.

This dataset represents sequential Oxford hip scores for 173 individual patients.

At twenty years post-surgery, 88% of these patients achieved an excellent or good score and had an average of 41.32

Oxford Scores (at 6 m) vs BMI Status

BMI	Mean	Standard Error of Mean	Number/ Group
< 19	38.86	0.925	76
19 - 24	40.93	0.165	1,809
25 - 29	40.70	0.128	3,102
30 - 39	39.31	0.153	2,539
40+	37.15	0.567	241
Total	**40.17**	**0.084**	**7,767**

Revision hip questionnaire responses

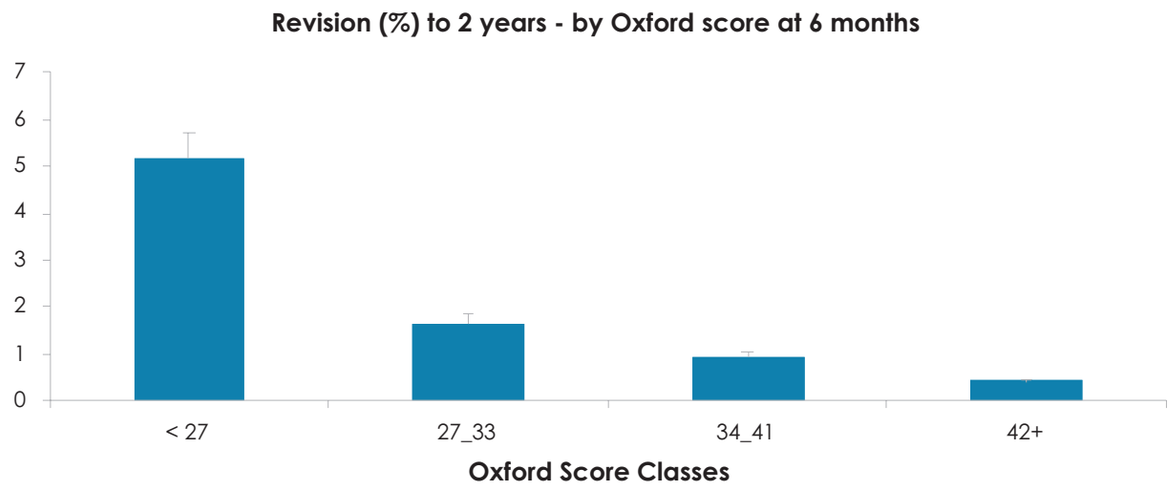
There were 10,357 revision hip responses with 62% achieving an excellent or good score. This group includes all revision hip procedures including revisions of primary arthroplasties performed prior to 1999. The average revision hip score was 35.02 (standard deviation 9.87, range 48 – 2).

OXFORD 12 SCORE AS A PREDICTOR OF HIP ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months, five and ten years' post-surgery and arthroplasty revision within two years of the Oxford 12 questionnaire date.

Six month score and revision arthroplasty

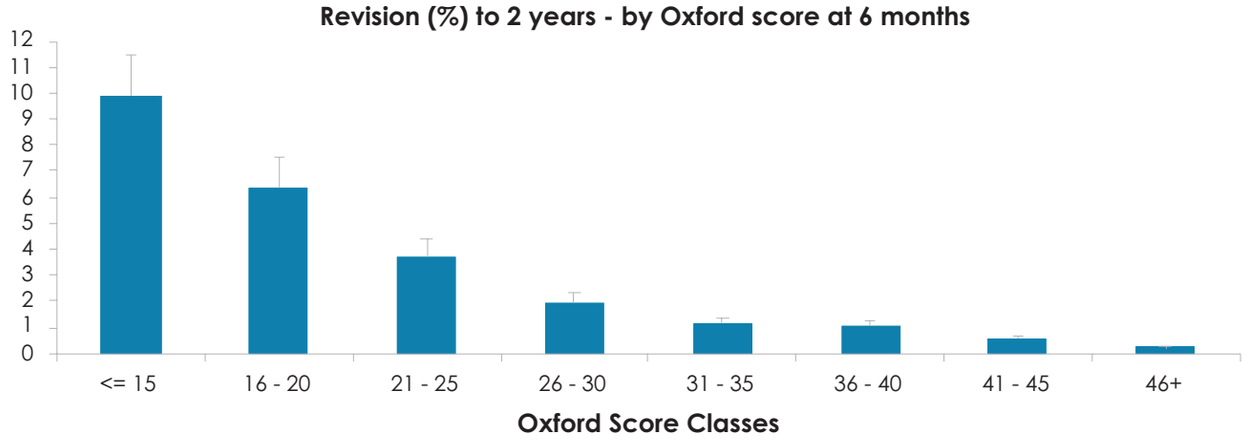
By plotting the patients' six month scores in the Kalairajah groupings against the proportion of hips revised for that same group it demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 13 times the risk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



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

Kalairajah Group	Number in Group	Number revised	%	Standard error
< 27	1,848	96	5.19	0.52
27_33	2,720	44	1.62	0.24
34_41	7,859	75	0.95	0.11
42+	16,186	67	0.41	0.05

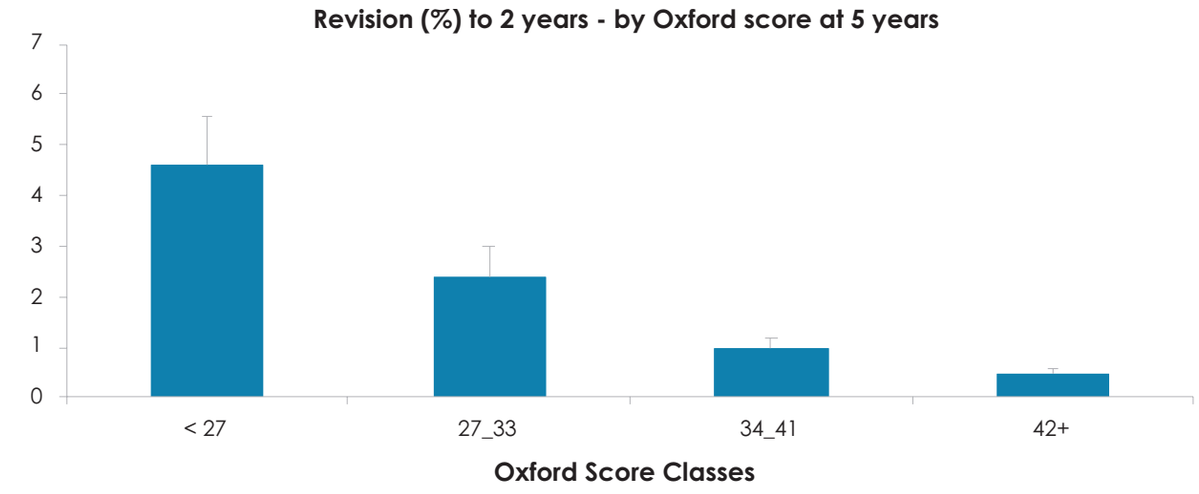
In view of the large number of six month Oxford scores it is possible with statistical significance to further break down the score groupings to demonstrate an even more convincing relationship between score and risk of revision within two years.



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

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 10 times the risk of a revision within two years compared to a person with a score >41.



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

Kalairajah Group	Number in Group	Number revised	%	Standard error
< 27	436	20	4.59	1.00
27_33	630	15	2.38	0.61
34_41	1,892	18	0.95	0.22
42+	6,949	33	0.47	0.08

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 7 times the risk of a revision within two years compared to a person with a score >41.

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

Kalairajah Group	Number in Group	Number revised	%	Standard error
< 27	341	30	8.80	1.53
27_33	439	21	4.78	1.02
34_41	1,245	28	2.25	0.42
42+	4,190	51	1.22	0.17

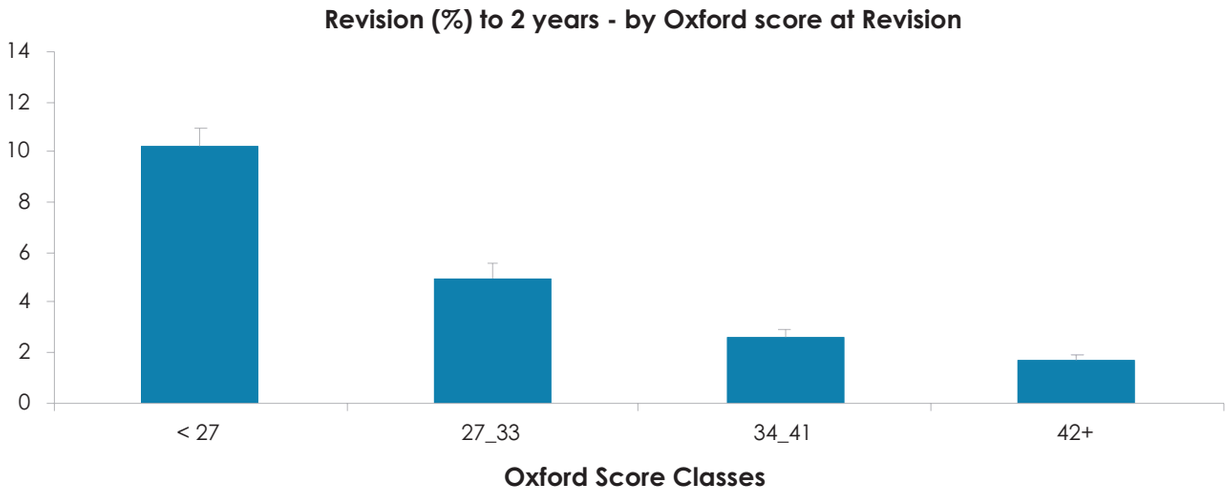
Fifteen year score and revision arthroplasty

As with the six month, five year and 10 year scores, plotting the patients' fifteen 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 7 times the risk of a revision within two years compared to a person with a score >41

Kalairajah Group	Number in Group	Number revised	%	Standard error
< 27	136	13	9.56	2.52
27_33	141	6	4.26	1.70
34_41	392	12	3.06	0.87
42+	1,252	18	1.44	0.34

Prediction of second revision from six month score following first revision

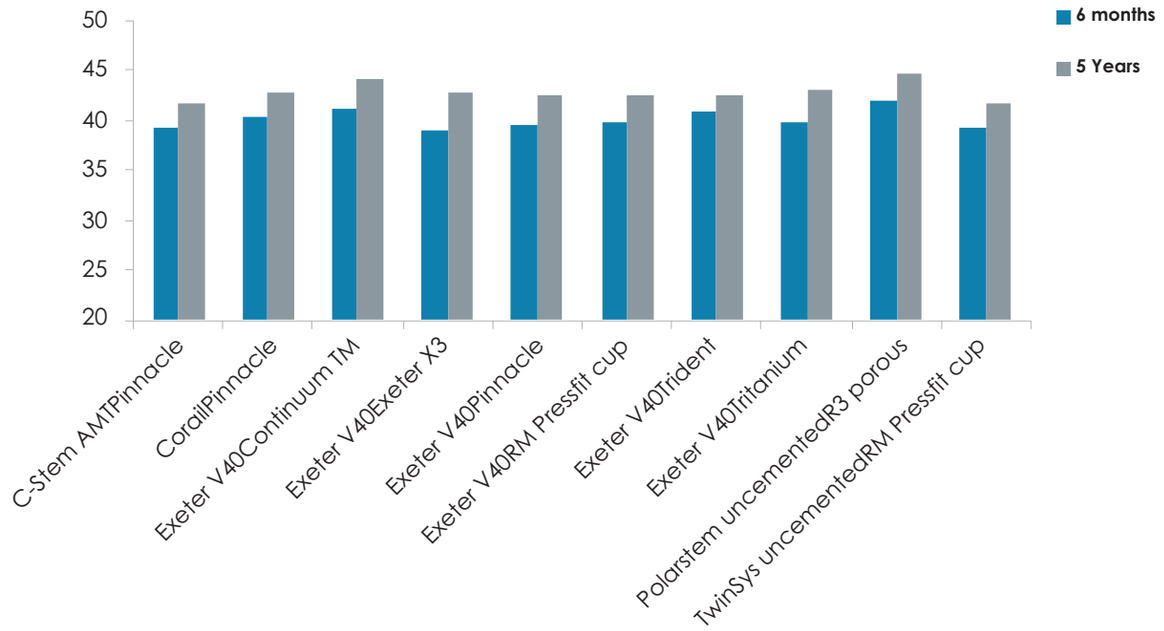
Plotting the patients' six month scores, following their first revision in the Kalairajah groupings, against the proportion of hips revised for that same group, again demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score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



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 years	Number revised	%	Standard error
< 27	1,452	148	10.19	0.79
27_33	1,404	70	4.99	0.58
34_41	2,561	68	2.66	0.32
42+	2,739	47	1.72	0.25

Mean Oxford scores at 6 months and 5 years for 8 hip combinations with > 2000 registrations.

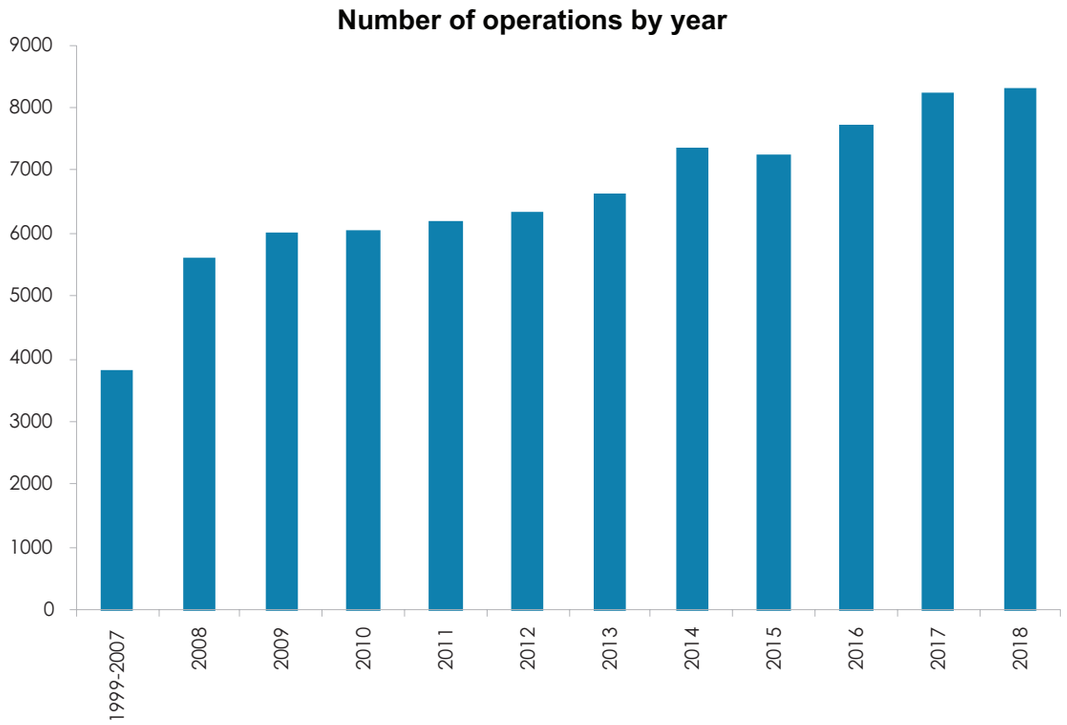


KNEE ARTHROPLASTY

PRIMARY KNEE ARTHROPLASTY

The **twenty year** report analyses data for the period January 1999 – December 2018. There were 110,678 primary knee procedures registered, an additional 8,392 compared to last year's report.

The 110,678 includes 602 patello-femoral prostheses with 71 registered in 2018.



Data Analysis

Age and sex distribution

The average age for a knee replacement was 68 years, with a range of 8 – 100 years.

All knee arthroplasty

	Female	Male
Number	57,152	53,529
Percentage	51.64	48.36
Mean age	68.52	67.86
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.71	9.26

Conventional knee arthroplasty

	Female	Male
Number	56,708	53,371
Percentage	51.51	48.49
Mean age	68.59	67.89
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.67	9.24

Patello-femoral arthroplasty

	Female	Male
Number	444	158
Percentage	73.75	26.25
Mean age	60.03	60.13
Maximum age	89.39	88.84
Minimum age	31.15	31.25
Standard dev.	11.42	10.89

Body Mass Index

For the nine-year period 2010 - 2018, there were 43,273 BMI registrations for primary knee replacements. The average was 31.30 (obese) with a range of 15 – 68.7 and a standard deviation of 6.00.

Previous operation

None	92,959
Menisectomy	11,183
Osteotomy	1,606
Ligament reconstruction	1,550
Internal fixation	859
Synovectomy	178

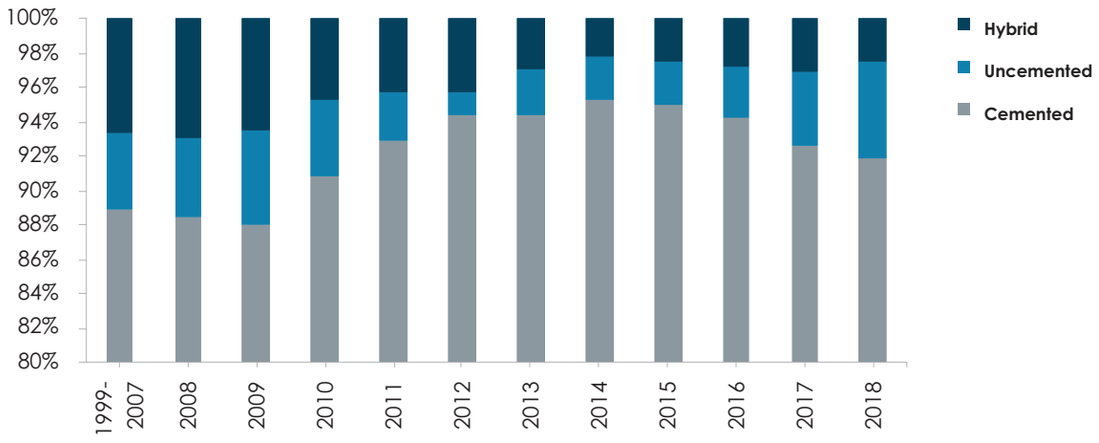
Diagnosis	
Osteoarthritis	105,061
Rheumatoid arthritis	2,362
Post fracture	1,159
Post ligament disruption	931
Other inflammatory	831
Avascular necrosis	374
Tumour	96

Approach	
Medial parapatellar	92,825
Image guided	14,599
Other	2,653
Lateral parapatellar	1,412
Minimally invasive surgery	227
Robot navigation	44

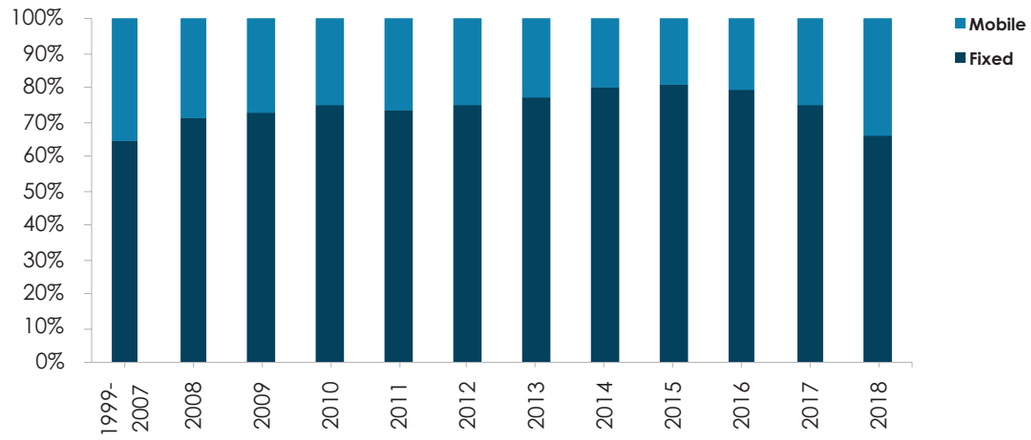
Bone graft	
Femoral autograft	314
Femoral allograft	17
Femoral synthetic	11
Tibial autograft	105
Tibial allograft	22
Tibial synthetic	4

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

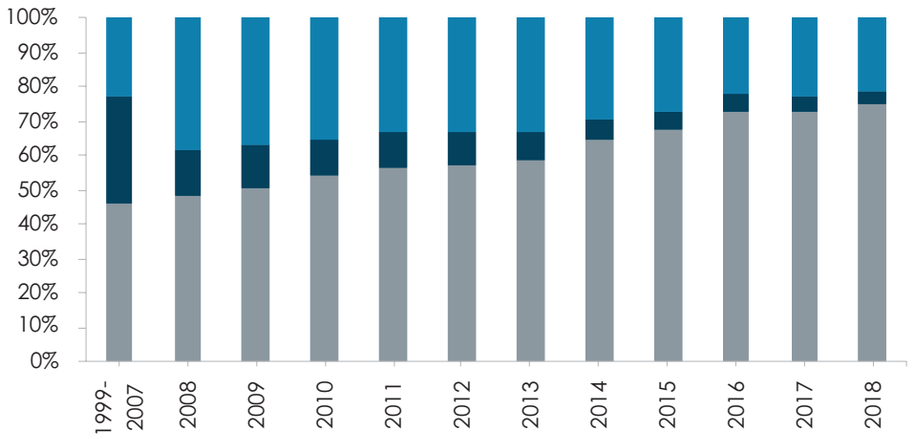
Hybrid knees have a cemented tibia and uncemented femur. Uncemented TKA fixation remains common in NZ, but in the last 3 years the previous downward trend has reversed.



Proportion of fixed vs mobile knees by year



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



OTHER = minimally stabilised of which 98% are LCS

Cement

Femur cemented	101,886 92%
Antibiotic in cement	68,784 68%
Tibia cemented	105,309 95%
Antibiotic in cement	70,490 67%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	105,025 95%

Operating theatre

Conventional	60,878
Laminar flow	48,884
Space suits	37,360

ASA Class

This was introduced with the updated forms at the beginning of 2005. For the fourteen year period 2005 – 2018, there were 88,309 (95%) 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	9,815	11
2	56,139	64
3	21,997	24
4	356	1

Operative time (skin to skin in minutes)

Average	83 mins

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the fourteen-year period 2005 – 2018.

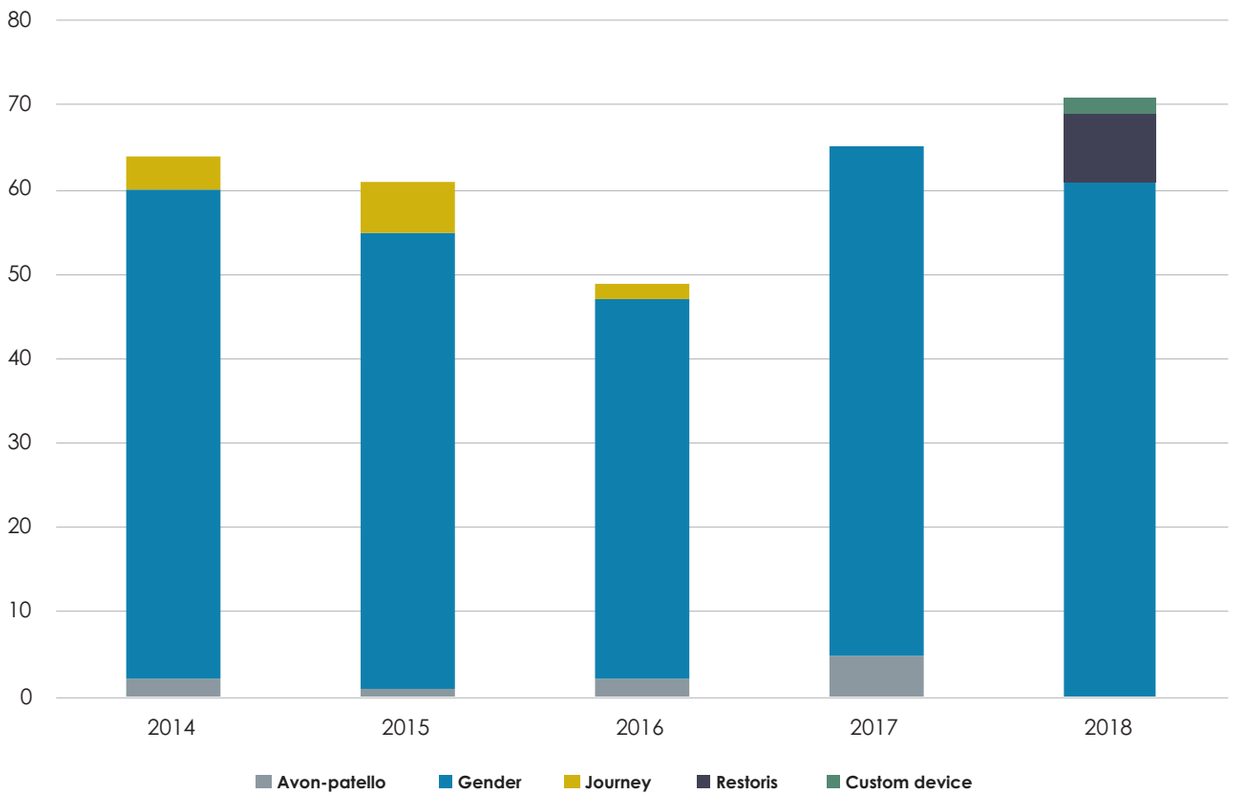
Consultant	81,678
Advanced trainee supervised	7,162
Basic trainee	1,798
Advanced trainee unsupervised	1,599

Prosthesis usage

Patello-femoral prostheses used in 2018

Gender	61
Restoris Mako	8
Custom device	2

Patello- femoral prostheses used for five years 2014 - 2018



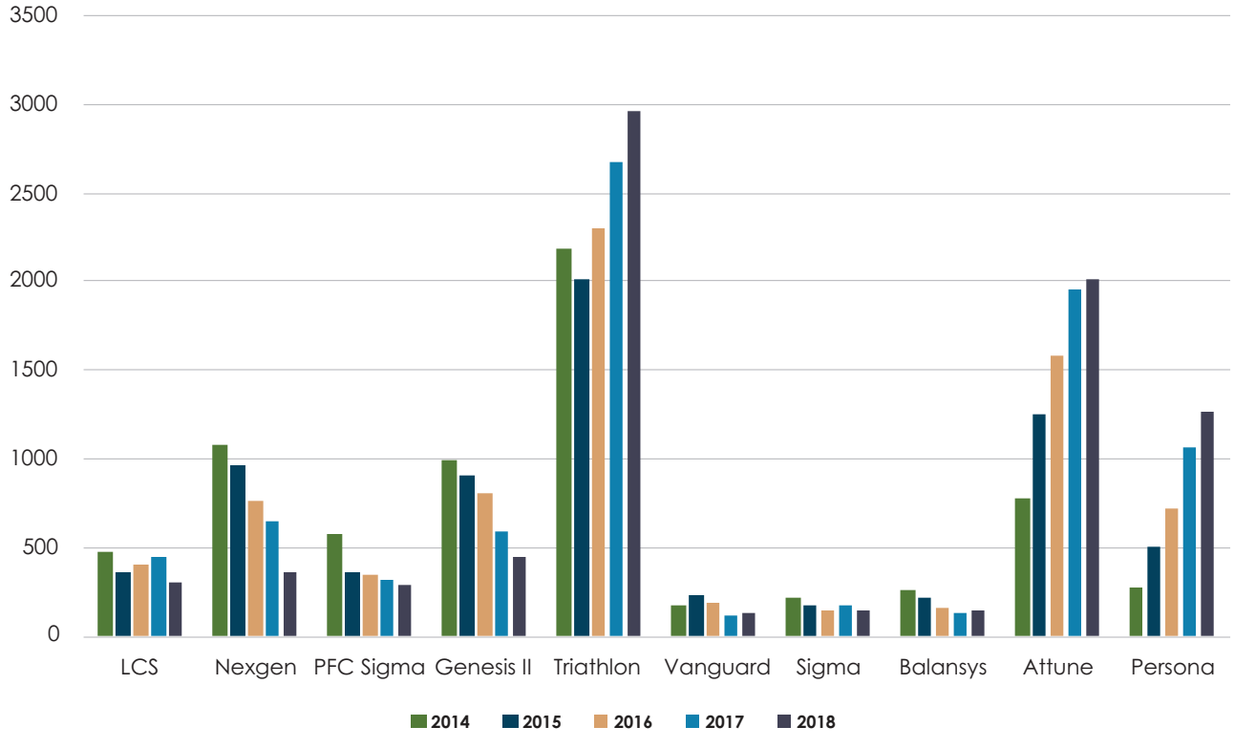
In 2018 there were 71 patello-femoral procedures registered to 27 surgeons.

Conventional primary knees

Top ten knee prostheses used in 2018

Triathlon	2,958
Attune	2,015
Persona	1,263
Genesis II	450
Nexgen	362
LCS	302
PFC Sigma	293
Balansys	148
Sigma	141
Vanguard	134

Most Used Knee Prostheses per year for five years 2014 – 2018



Surgeon and hospital workload

Surgeons

In 2018, 234 surgeons performed 8,371 total knee replacements, an average of 36 procedures per surgeon.

43 surgeons performed less than ten procedures and 73 performed more than 40.

Hospitals

In 2018 primary knee replacement was performed in 51 hospitals. 27 were public hospitals and 24 were private.

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 twenty year period January 1999 – December 2018, there were 8,647 revision knee procedures registered. This is an additional 635 compared to last year's report.

The average age for a revision knee replacement was 70 years, with a range of 11 – 98 years.

Revision knees

	Female	Male
Number	4,083	4,564
Percentage	47.22	52.78
Mean age	69.92	69.27
Maximum age	95.80	98.39
Minimum age	10.57	15.00
Standard dev.	10.24	10.10

Body Mass Index

For the nine-year period 2010 - 2018, there were 1,843 BMI registrations for revision knee replacements. The average BMI was 31.40 (obese) with a range of 15 – 65 and a standard deviation of 6.10.

REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTIES

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

There were 3,652 revisions of the 110,076 primary conventional total knee replacements (3.3%) and 58 revisions of the 602 patello-femoral prostheses (9.6%), a total of 3,710 revisions.

Conventional knee replacement analysis

Time to revision

Average	1,514 days
Maximum	6,922 days
Minimum	1 day
Standard deviation	1,437 days

Reason for revision

Pain	1,077
Deep infection	974
Primary patellar component	918
Loosening tibial	849
Loosening femoral component	395
Loosening patellar component	69
Fracture femur	70
Fracture tibia	42

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

Analysis of the five main reasons for revision by year after primary procedure

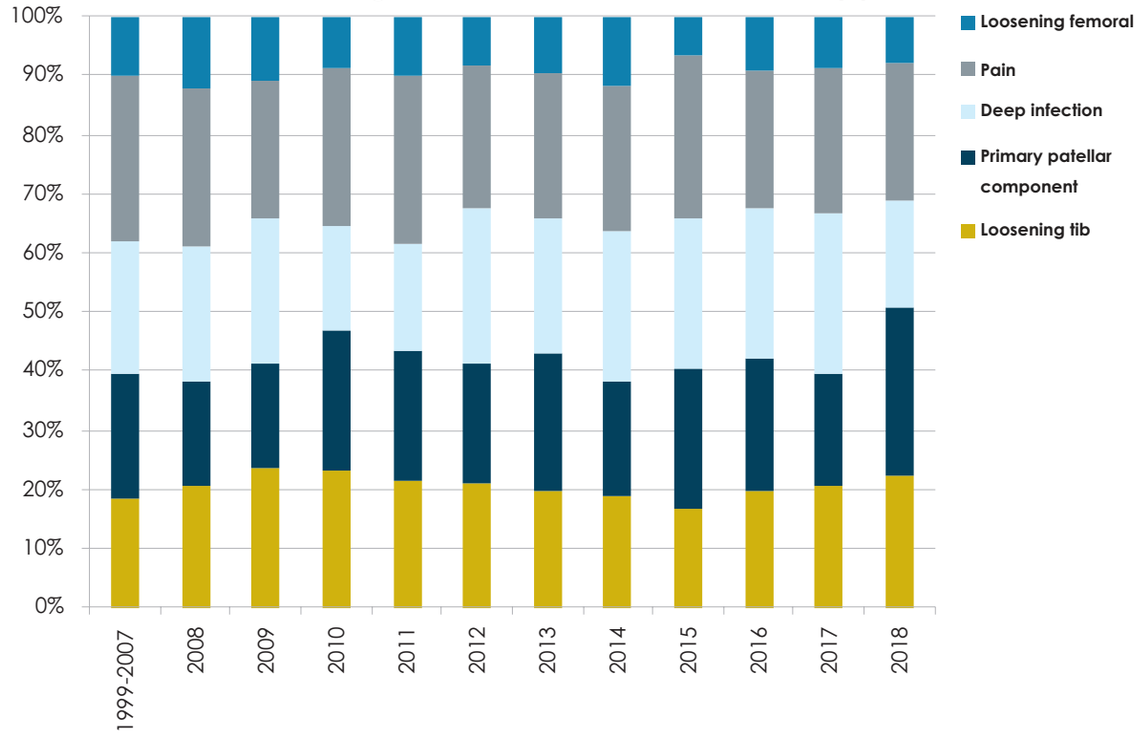
NB each year column does not add up to exactly 100% as often more than one cause for revision is listed and there are other reasons for revision other than the five above listed in the registry.

	Loosening tibial component		Primary patellar component		Deep infection		Pain		Loosening femoral component	
Years	Count	%	Count	%	Count	%	Count	%	Count	%
0	43	5.1	110	12.0	384	39.4	142	13.2	16	4.1
1	80	9.4	244	26.6	182	18.7	272	25.3	37	9.4
2	109	12.8	154	16.8	99	10.2	170	15.8	34	8.6
3	95	11.2	91	9.9	85	8.7	109	10.1	33	8.4
4	78	9.2	62	6.8	51	5.2	73	6.8	43	10.9
5	71	8.4	39	4.2	33	3.4	55	5.1	32	8.1
6	77	9.1	39	4.2	33	3.4	42	3.9	30	7.6
7	55	6.5	36	3.9	25	2.6	43	4.0	27	6.8
8	41	4.8	29	3.2	18	1.8	36	3.3	22	5.6
9	53	6.2	26	2.8	18	1.8	23	2.1	25	6.3
10	32	3.8	22	2.4	12	1.2	32	3.0	18	4.6
>10	115	13.5	66	7.2	34	3.5	80	7.4	78	19.7
Total	**849**		**918**		**974**		**1,077**		**395**	

Analyses by numbers of the five main reasons for revision by year

Years	Loosening tibial component No.	Primary patellar component No.	Deep infection No.	Pain No.	Loosening femoral component No.
1999-2007	140	158	169	213	76
2008	42	37	47	55	25
2009	52	39	54	51	24
2010	53	54	40	61	20
2011	52	53	44	70	24
2012	54	52	68	63	21
2013	62	74	73	78	30
2014	63	64	85	81	39
2015	59	84	91	97	24
2016	90	101	115	105	41
2017	86	80	112	103	37
2018	96	122	76	100	34

Percentage of the 5 main reasons for revision by year



Patello-Femoral Arthroplasty

Revision of patello-femoral knees

Of the 602 registered, n = 58 have been revised.

Time to revision

Average	1,779 days
Maximum	5,718 days
Minimum	108 days
Standard deviation	1,479 days

Reason for revision

Pain	22
Loosening patellar	4
Deep infection	4

Patellar resurfacing

63 % of the 110,079 registered conventional primary knees did not have the patella resurfaced and 37% did have the patella resurfaced. Of the group that was not resurfaced, 914 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.

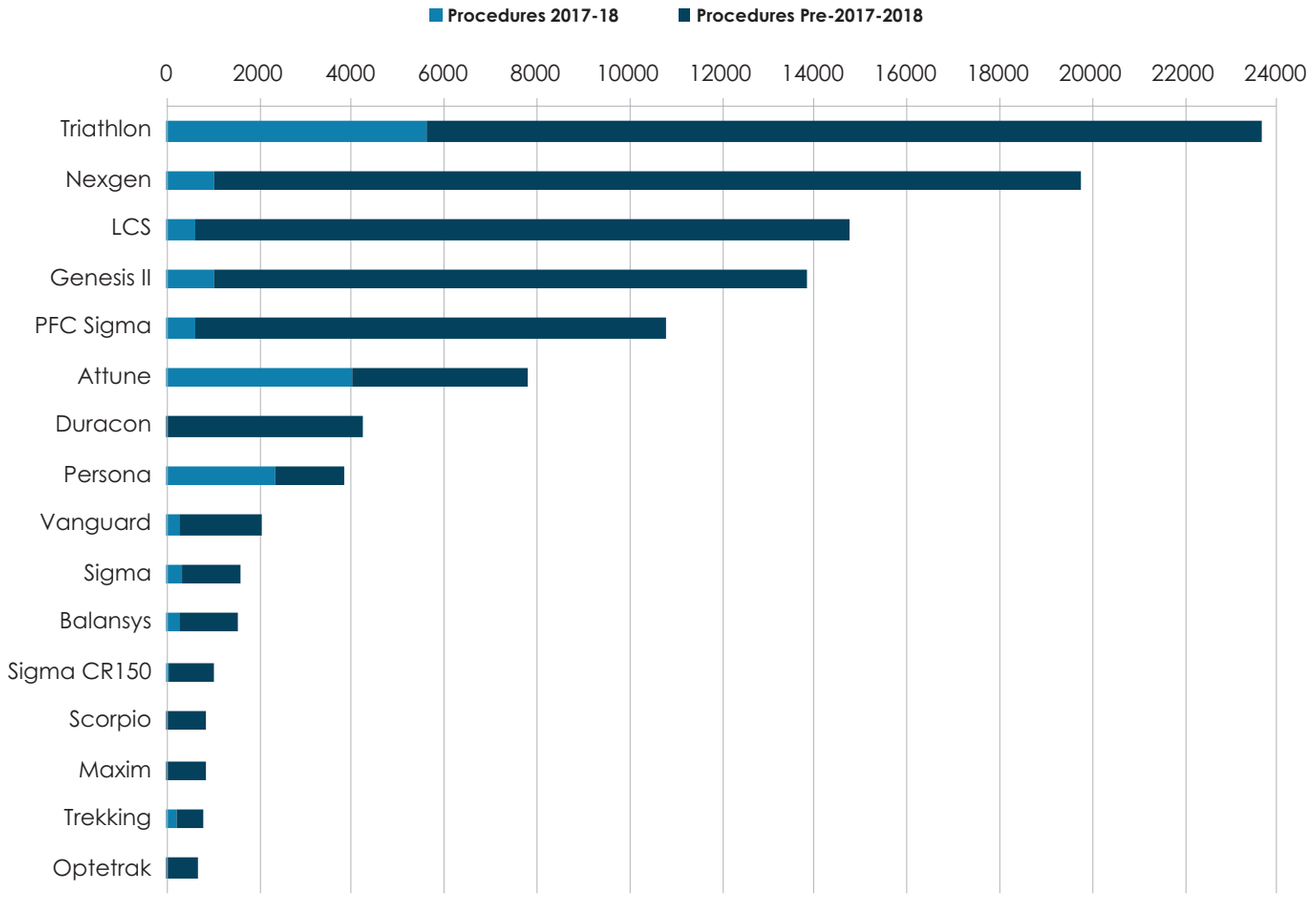
Statistical Significance

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.

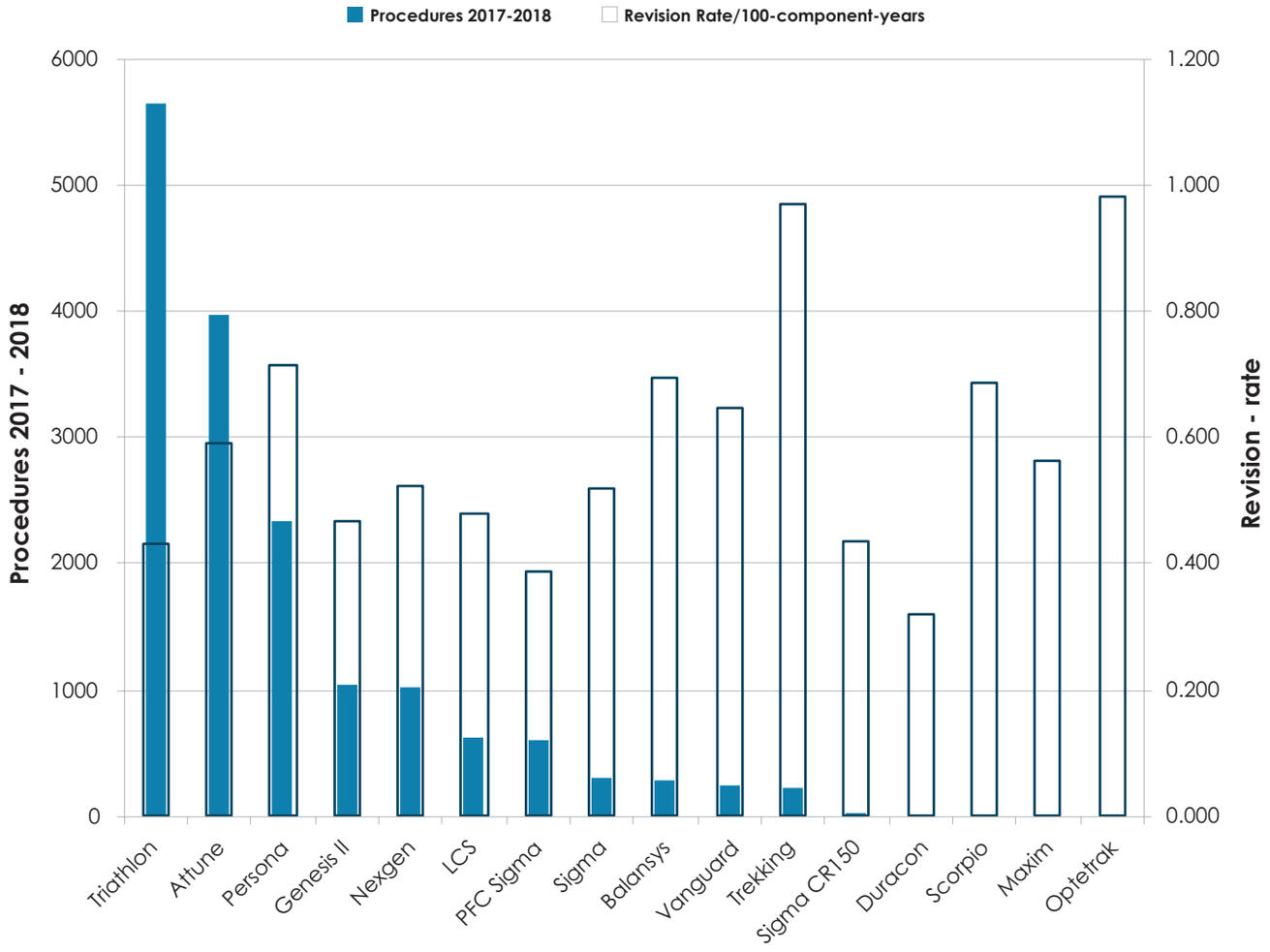
All Primary Conventional Knee Arthroplasties

No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
110,076	753,723	3,652	0.48	0.47	0.50

The figure below summarises the 16 Knee prostheses with >500 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.



The figure below summarises the 16 Knee prostheses with >500 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



Revision Rate of Individual Knee Prostheses Sorted by Number of Arthroplasties

(Minimum of 50 arthroplasties)

Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Triathlon	23,650	116,467.5	501	0.430	0.393	0.469
Nexgen	19,728	155,715.1	813	0.522	0.487	0.559
LCS	14,769	139,891.7	670	0.479	0.443	0.517
Genesis II	13,823	100,420.7	468	0.466	0.425	0.510
PFC Sigma	10,789	91,493.9	356	0.389	0.349	0.431
Attune	7,789	16,207.7	96	0.592	0.480	0.723
Duracon	4,213	49,295.6	158	0.321	0.272	0.373
Persona	3,854	6,842.5	49	0.716	0.530	0.947
Vanguard	2,073	10,961.4	71	0.648	0.502	0.812
Sigma	1,600	7,104.8	37	0.521	0.367	0.718
Balansys	1,555	6,472.2	45	0.695	0.507	0.930
Sigma CR150	997	6,197.2	27	0.000	0.287	0.634
Scorpio	852	9,635.8	66	0.685	0.530	0.871
Maxim	822	9,759.9	55	0.564	0.425	0.734
Trekking	792	2,781.0	27	0.971	0.625	1.391
Optetrak	661	5,798.3	57	0.983	0.745	1.274
AGC	376	4,493.9	18	0.401	0.237	0.633
Journey	330	1,526.3	17	1.114	0.649	1.783
MBK	256	3,407.6	18	0.528	0.313	0.835
Insall/Burstein	249	2,988.9	47	1.572	1.141	2.072
Legion	241	911.5	7	0.768	0.309	1.582
Advance	157	1,804.4	6	0.333	0.122	0.724
AMK	95	1,277.6	2	0.157	0.019	0.565
Saiph	93	153.7	2	1.301	0.158	4.701
ROCC	66	639.5	6	0.938	0.344	2.042

Revision Rate of Individual Knee Prostheses Sorted by Revision Rate

(Minimum of 50 arthroplasties)

Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
*Insall/Burstein	249	2,988.9	47	1.572	1.141	2.072
Saiph	93	153.7	2	1.301	0.158	4.701
*#Journey	330	1,526.3	17	1.114	0.649	1.783
*Optetrak	661	5,798.3	57	0.983	0.745	1.274
*#Trekking	792	2,781.0	27	0.971	0.625	1.391
ROCC	66	639.5	6	0.938	0.344	2.042
Legion	241	911.5	7	0.768	0.309	1.582
*#Persona	3,854	6,842.5	49	0.716	0.530	0.947
*#Balansys	1,555	6,472.2	45	0.695	0.507	0.930
*Scorpio	852	9,635.8	66	0.685	0.530	0.871
Vanguard	2,073	10,961.4	71	0.648	0.502	0.812
Attune	7,789	16,207.7	96	0.592	0.480	0.723
Maxim	822	9,759.9	55	0.564	0.425	0.734
MBK	256	3,407.6	18	0.528	0.313	0.835
Nexgen	19,728	155,715.1	813	0.522	0.487	0.559
Sigma	1,600	7,104.8	37	0.521	0.367	0.718
LCS	14,769	139,891.7	670	0.479	0.443	0.517
Genesis II	13,823	100,420.7	468	0.466	0.425	0.510
Triathlon	23,650	116,467.5	501	0.430	0.393	0.469
AGC	376	4,493.9	18	0.401	0.237	0.633
PFC Sigma	10,789	91,493.9	356	0.389	0.349	0.431
Advance	157	1,804.4	6	0.333	0.122	0.724
Duracon	4,213	49,295.6	158	0.321	0.272	0.373
AMK	95	1,277.6	2	0.157	0.019	0.565
Sigma CR150	997	6,197.2	27	0.000	0.287	0.634

*Those marked with an * in the above table have revision rates significantly higher than the overall rate of 0.48/100 component years @ the 95% confidence interval. There are several other combinations with high revision rates, but without statistical significance because of the wide CIs.*

*Those marked with a # as well as an * indicate those combinations used during 2018. The Persona and Balansys were both on the top 10 list for 2018.*

It is to be noted that 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

Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Insall/Burstein	249	2,988.9	47	1.572	1.141	2.072
Saiph	93	153.7	2	1.301	0.158	4.701
Optetrak	281	2,511.5	31	1.234	0.822	1.729
Journey	330	1,526.3	17	1.114	0.649	1.783
Trekking	792	2,781.0	27	0.971	0.625	1.391
Legion	239	905.2	7	0.773	0.311	1.593
Persona	3,854	6,842.5	49	0.716	0.530	0.947
Balansys	1,555	6,472.2	45	0.695	0.507	0.930
Scorpio	852	9,635.8	66	0.685	0.530	0.871
Vanguard	2,054	10,857.3	69	0.636	0.490	0.799
Attune	7,582	16,004.6	93	0.581	0.466	0.708
Maxim	822	9,759.9	55	0.564	0.425	0.734
MBK	247	3,299.1	18	0.546	0.323	0.862
Nexgen	18,845	148,555.4	785	0.528	0.492	0.567
Genesis II	13,770	99,816.7	463	0.464	0.423	0.508
Sigma	1,365	6,286.5	29	0.461	0.309	0.663
Sigma CR150	997	6,197.2	27	0.436	0.287	0.634
Triathlon	23,011	114,501.4	487	0.425	0.388	0.464
AGC	376	4,493.9	18	0.401	0.237	0.633
LCS	9,566	95,641.4	378	0.395	0.356	0.437
PFC Sigma	9,935	85,915.6	321	0.374	0.333	0.416
Duracon	3,432	39,635.9	132	0.333	0.279	0.395
Advance	157	1,804.4	6	0.333	0.122	0.724
AMK	95	1,277.6	2	0.157	0.019	0.565

The Insall/Burstein, Trekking, Journey, Scorpio, Persona, Optetrak and Balansys have significantly higher revision rates than the overall rate of 0.48/100 component years at the 95% confidence interval. Balansys, Trekking and Persona prostheses were implanted in 2018.

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

(Minimum of 50 primary registered arthroplasties)

Femur Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Sigma	235	818.4	8	0.978	0.422	1.926
Optetrak	380	3,286.8	26	0.791	0.504	1.141
Triathlon	200	1,489.0	11	0.739	0.369	1.322
Genesis II	51	594.7	4	0.673	0.142	1.599
PFC Sigma	847	5,509.3	35	0.635	0.443	0.884
LCS	2,235	20,265.3	95	0.469	0.379	0.573
Nexgen	760	6,225.3	24	0.386	0.247	0.574
Duracon	321	4,372.3	14	0.320	0.167	0.523

The Optetrak is the only hybrid fixation prosthesis with significantly higher revision rates than the overall rate of 0.48/100 component years at the 95% confidence interval.

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

(Minimum of 50 primary registered arthroplasties)

Femur Prosthesis	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Attune	199	193.8	3	1.548	0.319	4.524
LCS	2,968	23,985.1	197	0.821	0.711	0.944
Triathlon	439	477.2	3	0.629	0.087	1.678
Nexgen	123	934.5	4	0.428	0.117	1.096
Duracon	460	5,287.4	12	0.227	0.111	0.384

The uncemented LCS still implanted in 2018 and has a significantly higher revision rate than the overall rate of 0.48/100 component years at the 95% confidence interval.

Revision Rates for Fixed vs Mobile Bearing Knees

Femur Prosthesis	Mobile/ Fixed	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
AGC	Fixed	376	4,493.9	18	0.401	0.237	0.633
AMK	Fixed	95	1,277.6	2	0.157	0.019	0.565
Balansys	Fixed	1,545	6,463.8	45	0.696	0.508	0.932
Duracon	Fixed	4,207	49,213.2	157	0.319	0.270	0.372
Genesis II	Fixed	13,811	100,399.5	468	0.466	0.425	0.510
Insall/Burstein	Fixed	249	2,988.9	47	1.572	1.141	2.072
Journey	Fixed	276	1,479.7	16	1.081	0.618	1.756
LCS	Mobile	14,767	139,888.4	670	0.479	0.443	0.517
Maxim	Fixed	822	9,759.9	55	0.564	0.425	0.734
MBK	Mobile	256	3,407.6	18	0.528	0.313	0.835
Trekking	Mobile	782	2,764.7	26	0.940	0.614	1.378
Persona	Fixed	3,844	6,832.8	49	0.717	0.531	0.948
Nexgen	Fixed	16,753	131,390.4	702	0.534	0.495	0.575
	Mobile	2,715	22,702.6	94	0.414	0.335	0.507
PFC Sigma	Fixed	7,315	5,8632.2	233	0.397	0.348	0.452
	Mobile	3,442	3,2603.6	122	0.374	0.311	0.447
Scorpio	Fixed	737	8346.3	57	0.683	0.512	0.878
	Mobile	104	1216.4	6	0.493	0.181	1.074
Sigma	Fixed	575	2,531.7	10	0.395	0.176	0.701
	Mobile	1,009	4,478.1	27	0.603	0.397	0.877
Sigma CR150	Fixed	188	1,218.6	10	0.821	0.365	1.456
	Mobile	808	4,974.4	17	0.342	0.199	0.547
Triathlon	Fixed	18,862	109,867.2	468	0.426	0.388	0.466
	Mobile	659	3,200.4	13	0.406	0.216	0.695
Attune	Fixed	3,300	7,644.8	43	0.562	0.402	0.750
	Mobile	3,992	8,385.7	51	0.608	0.453	0.800

In prostheses with both fixed and mobile variants there are no differences in revision rates between the two designs at the 95% confidence interval.

Overall Revision Rates for Fixed vs Mobile Bearing Knees

Fixed/Mobile	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Fixed	73,050	502,907	2,385	0.47	0.46	0.49
Mobile	28,563	223,752	1,044	0.47	0.44	0.50

There is no significant difference between the two groups. It was not possible to determine fixed or mobile categories for all registered knees, which accounts for the 5,813 versus the total number of TKA's.

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

Femur Prosthesis	CR/PS	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
AGC	PS	28	372.8	4	1.073	0.292	2.747
Insall/Burstein	PS	249	2,988.9	47	1.572	1.141	2.072
LCS	PS	70	468.9	2	0.426	0.052	1.541
Legion	PS	193	747.9	5	0.669	0.217	1.560
Sigma CR150	CR	997	6,197.2	27	0.436	0.287	0.634
Attune	CR	4,872	10,684.6	66	0.618	0.478	0.786
	PS	2,903	5,513.5	30	0.544	0.360	0.766
Balansys	CR	1,431	6,036.6	38	0.629	0.439	0.854
	PS	113	422.2	7	1.658	0.593	3.255
Genesis II	CR	7,357	58,585.7	197	0.336	0.291	0.387
	PS	6,459	41,789.6	271	0.648	0.572	0.729
Maxim	CR	657	7,747.0	38	0.491	0.347	0.673
	PS	165	2,012.9	17	0.845	0.473	1.322
Nexgen	CR	9,377	72,869.9	298	0.409	0.363	0.457
	PS	10,009	81,279.2	490	0.603	0.550	0.658
Optetrak	CR	437	3,854.8	30	0.778	0.525	1.111
	PS	224	1,943.5	27	1.389	0.895	1.991
Persona	CR	2,970	4,790.1	30	0.626	0.414	0.882
	PS	874	2,042.7	19	0.930	0.560	1.453
PFC Sigma	CR	8,840	72,519.6	263	0.363	0.320	0.409
	PS	1,888	18,490.5	93	0.503	0.404	0.613
Scorpio	CR	739	8,530.1	56	0.656	0.496	0.853
	PS	111	1,089.6	10	0.918	0.440	1.688
Sigma	CR	278	1,053.5	0	0.000	0.000	0.350
	PS	1,321	6,046.1	37	0.612	0.431	0.844
Trekking	CR	295	1,076.8	10	0.929	0.445	1.708
	PS	487	1,687.9	16	0.948	0.542	1.539
Triathlon	CR	20,574	96,901.8	414	0.427	0.387	0.470
	PS	3071	19,556.2	87	0.445	0.356	0.549
Vanguard	CR	1,486	7,924.2	46	0.581	0.425	0.774
	PS	570	2,996.1	25	0.834	0.540	1.232

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	60,310	358,772.0	1,513	0.42	0.40	0.44
Other	15,010	143,448.8	692	0.48	0.45	0.52
PS	28,740	189,483.7	1,188	0.63	0.59	0.66

The LCS prostheses account for the majority of the minimally stabilised (MS). There is a significantly higher revision rate for the 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	Exact 95% confidence interval	
Cemented	100,752	679,552.5	3,204	0.47	0.46	0.49
Uncemented	4,202	30,981.7	220	0.71	0.62	0.81
Hybrid	5,122	43,188.8	228	0.53	0.46	0.60

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	9,108	68,055.9	613	0.90	0.83	0.97
55-64	30,725	219,557.2	1,346	0.61	0.58	0.65
65-74	42,298	291,931.2	1,246	0.43	0.40	0.45
>=75	27,945	174,178.7	447	0.26	0.23	0.28

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

Revision vs Gender

Gender	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
F	56,707	395,714.5	1,756	0.44	0.42	0.47
M	53,369	358,008.6	1,896	0.53	0.51	0.55

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	7,813	56,520.4	482	0.85	0.78	0.93
55-64	27,614	193,494.7	1,170	0.60	0.57	0.64
65-74	39,128	267,329.9	1,146	0.43	0.40	0.45
>=75	26,197	162,207.5	406	0.25	0.23	0.28

Revision by Age Bands vs Arthroplasty Fixation

Uncemented	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
<55	676	6,172.7	80	1.30	1.03	1.61
55-64	1,513	11,632.9	86	0.74	0.59	0.91
65-74	1,352	9,226.4	44	0.48	0.35	0.64
>=75	661	3,949.6	10	0.25	0.11	0.45

Hybrid	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
<55	619	5,362.7	51	0.95	0.71	1.25
55-64	1,598	14,429.7	90	0.62	0.50	0.77
65-74	1,818	15,374.9	56	0.36	0.27	0.47
>=75	1,087	8,021.6	31	0.39	0.26	0.55

Revision vs Approach

Approach	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Medial	99,008	677,499.6	3,243	0.48	0.46	0.50
Lateral	1,379	11,055.4	77	0.70	0.55	0.87
Other	2,387	18,199.5	72	0.40	0.31	0.50

The lateral approach has a significantly higher revision rate than the other two approaches.

Revision vs. Image Guidance

Image Guided	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
No	95,508	682,687.4	3,311	0.48	0.47	0.50
Yes	14,568	71,035.7	341	0.48	0.43	0.53

There is no significant difference between the two groups.

Revision vs Surgeon Annual Output

Operations per year	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
<10	2,127	16,561.4	78	0.47	0.37	0.59
10-24	21,807	162,061.0	849	0.52	0.49	0.56
25-49	50,024	345,309.7	1,642	0.48	0.45	0.50
50-74	22,677	149,920.5	703	0.47	0.43	0.50
75-99	5,894	32,314.5	133	0.41	0.34	0.49
>=100	7,547	47,556.0	247	0.52	0.46	0.59

There is no significant difference between the groups.

Revision vs ASA Status

ASA Class	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
1	9,653	57,770.9	307	0.53	0.47	0.59
2	55,796	314,976.0	1,520	0.48	0.46	0.51
3	21,940	111,870.1	626	0.56	0.52	0.60
4	357	1,580.1	9	0.57	0.26	1.08

Revision vs. BMI

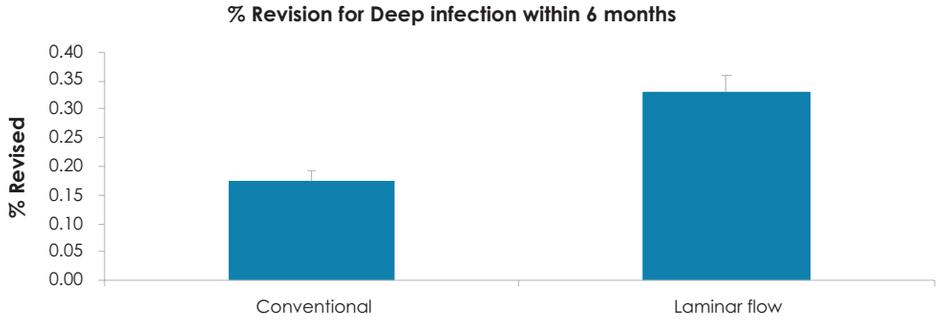
(BMI has been collected by the NZJR since 2010)

BMI	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
< 19	89	331.6	0	0.00	0.00	1.11
19 - 24	4,740	16,766.4	111	0.66	0.54	0.80
25 - 29	14,021	50,420.8	286	0.57	0.50	0.64
30 - 39	20,027	70,423.0	413	0.59	0.53	0.65
40+	4,040	14,133.5	117	0.83	0.68	0.99

40+ group has a significantly higher revision rate than the two groups before it.

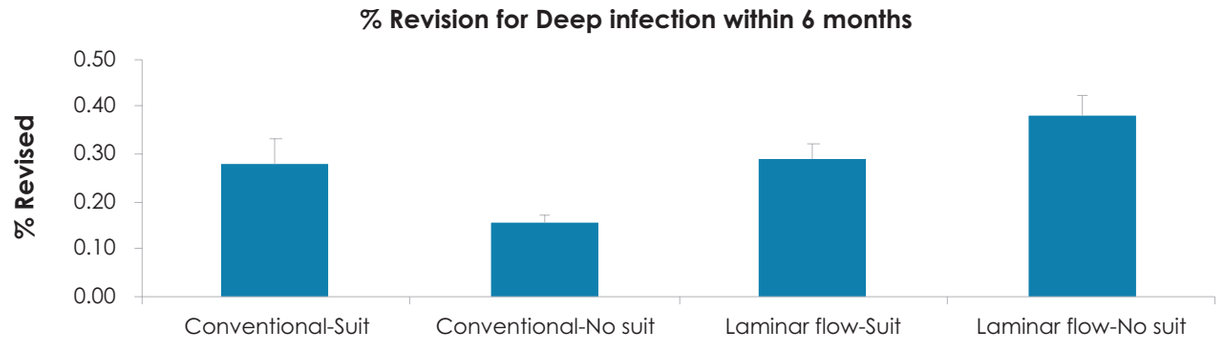
Revision for Deep Infection within six months versus Theatre Environment

Theatre Environment	Total number	Number revised	%	Standard error
Conventional	57,988	101	0.17417	0.01732
Laminar flow	46,453	154	0.33152	0.02667



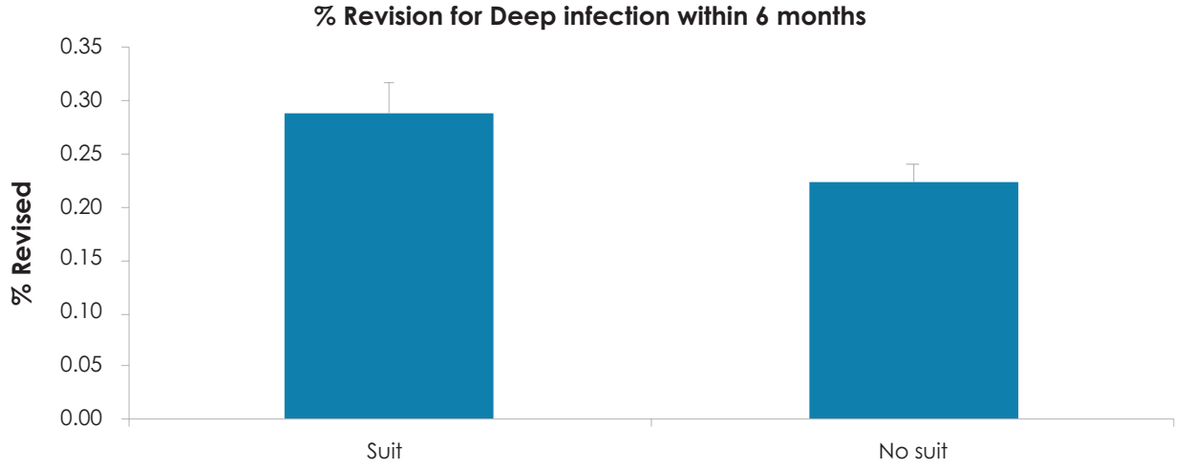
As with hip arthroplasty, there is a significant difference in knee revision rates (2x) for deep infection within six months of surgery between conventional and laminar flow theatres.

Theatre Environment	Suit/No Suit	Total number	Number revised	%	Standard error
Conventional-Suit	Suit	9,665	27	0.27936	0.05369
Conventional-No suit	no suit	48,323	74	0.15314	0.01779
Laminar flow-Suit	Suit	25,212	73	0.28954	0.03384
Laminar flow-No suit	no suit	21,242	81	0.38132	0.04229



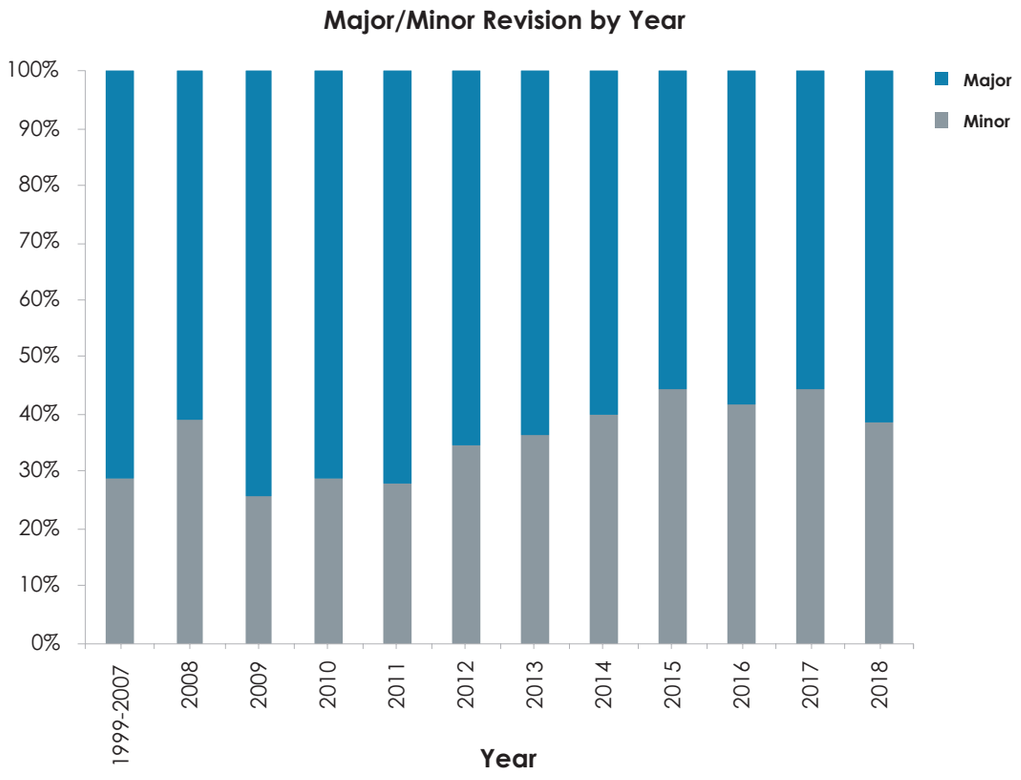
There is a significant difference in the revision rates between conventional/no suit and the conventional/suit and laminar/suit environments. See Tayton et al BJJ. 2016 98-B (3), 334-340 for a more detailed analysis of infection data.

	Total number	Number revised	%	Standard error
Suit	34,877	100	0.28672	0.02863
No suit	69,565	155	0.22281	0.01788



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.

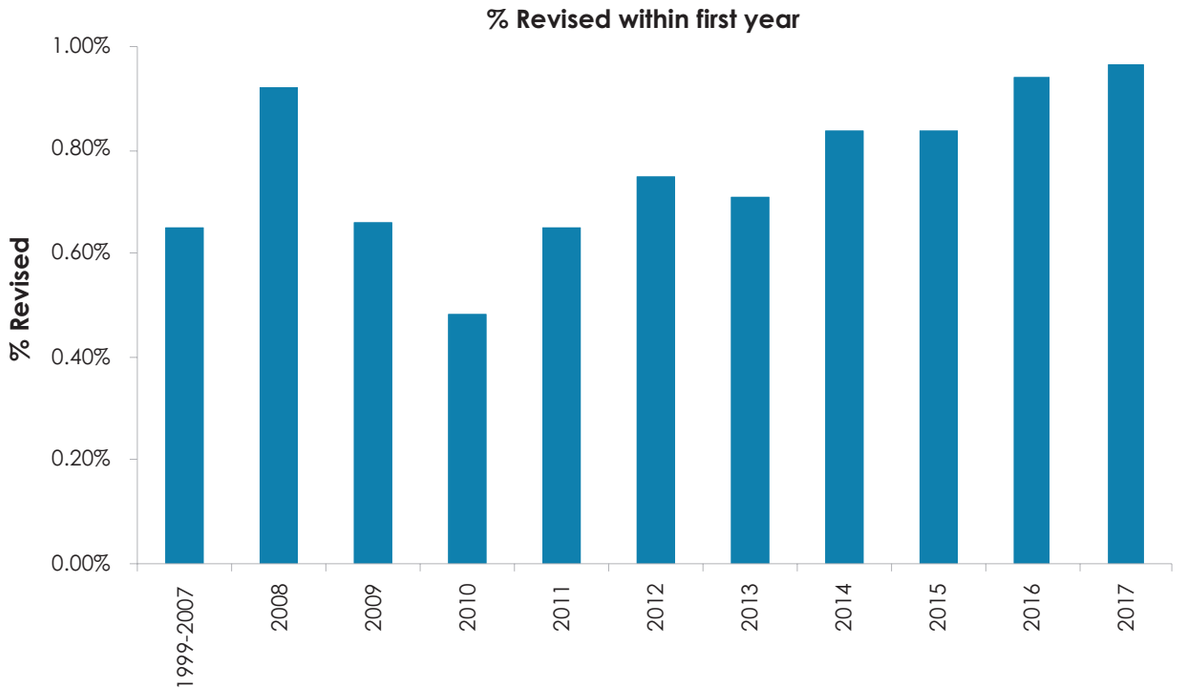


Re-revisions for major vs minor knee revisions

Major/Minor	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Minor	1,106	4,649	195	4.19	3.63	4.83
Major	1,943	9,886	283	2.86	2.54	3.22

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

Percentage of knees revised in the first year



Patello-Femoral Arthroplasty

No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
602	3,045	58	1.91	1.45	2.46

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

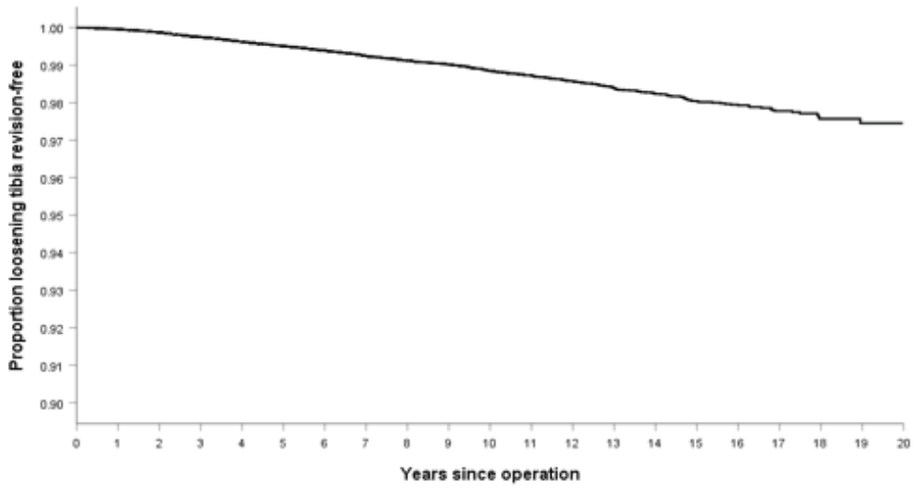
Revised to:

Total	52
Patello- Femoral	3
Uniknee	3

KAPLAN MEIER CURVES

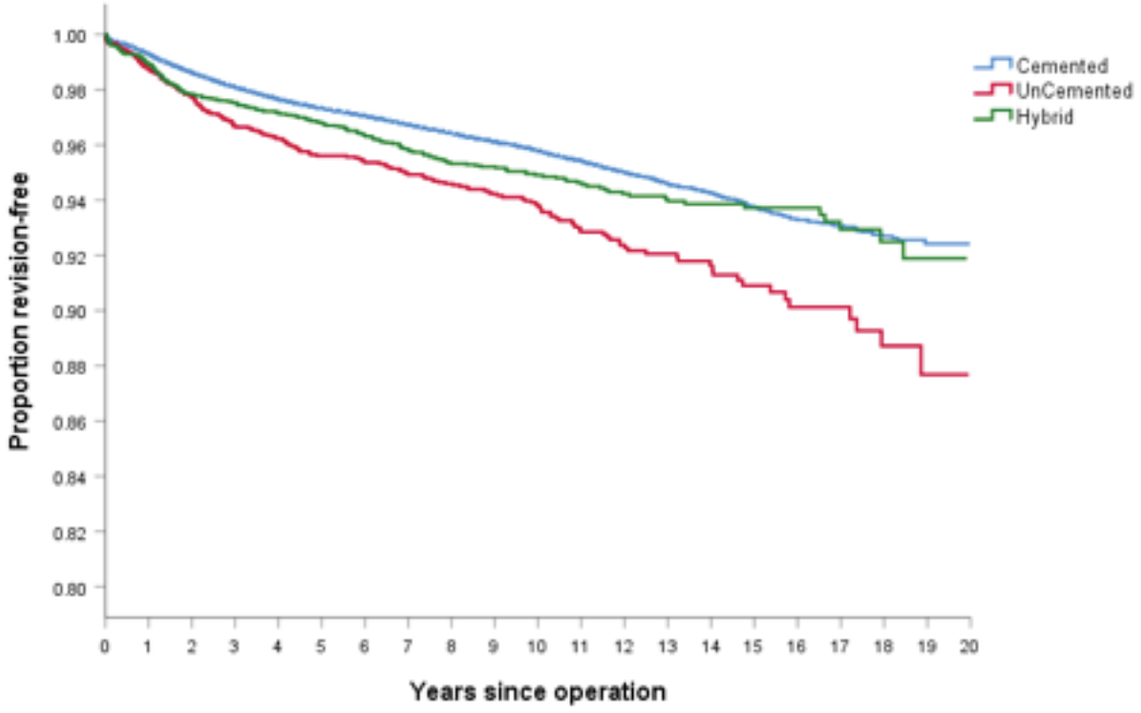
The following Kaplan Meier survival analyses are for the 20 years 1999 – 2018 with deceased patients censored at time of death.

All Knees

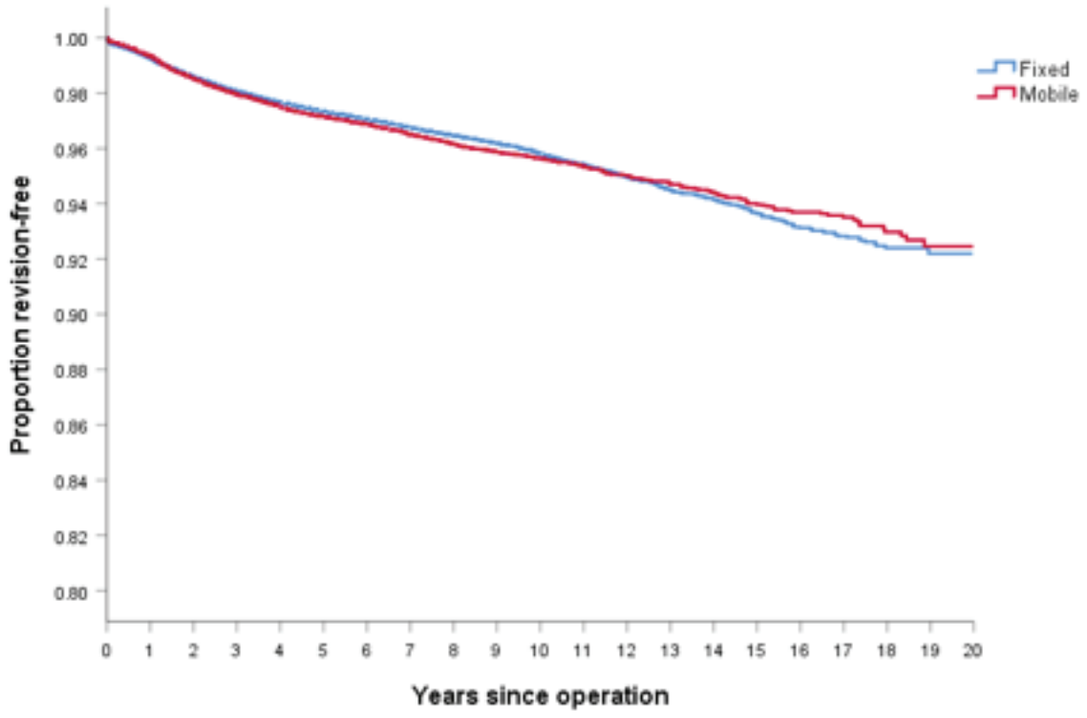


Years	% Revision-free	No. in each year
1	99.3	100,124
2	98.5	90,213
3	98.0	80,947
4	97.6	72,308
5	97.2	63,722
6	96.9	55,842
7	96.6	48,481
8	96.3	41,474
9	96.0	34,867
10	95.7	28,606
11	95.3	23,097
12	94.9	17,978
13	94.4	13,681
14	94.1	9,979
15	93.7	7,114
16	93.2	5,044
17	92.9	3,435
18	92.5	2,008
19	92.1	795

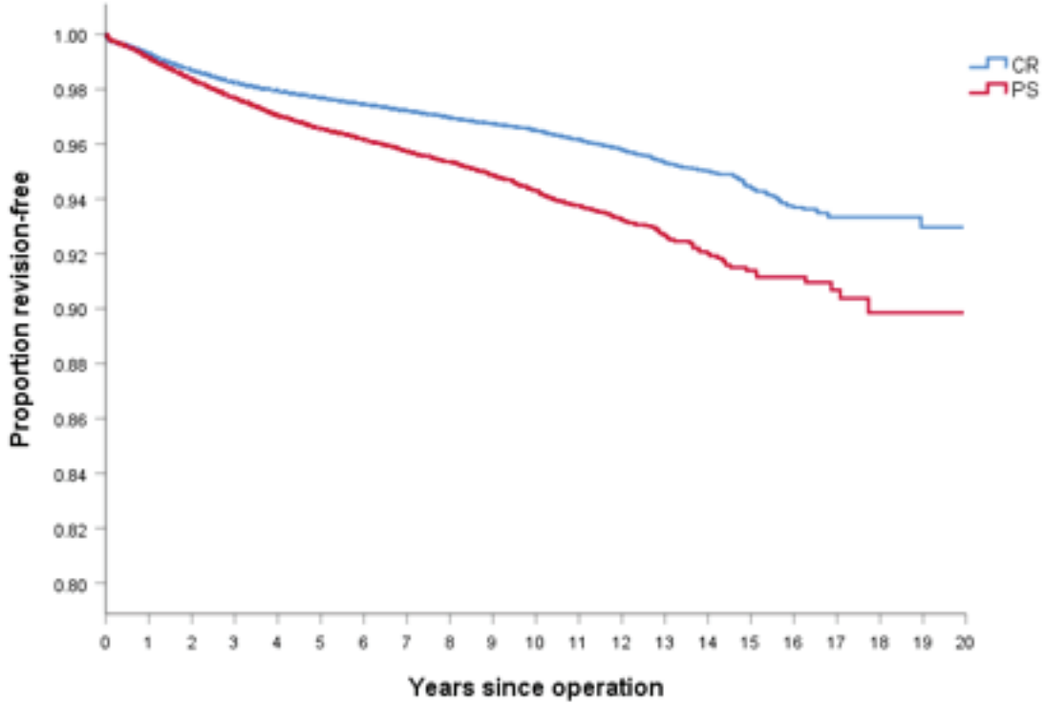
Cemented vs Uncemented vs Hybrid



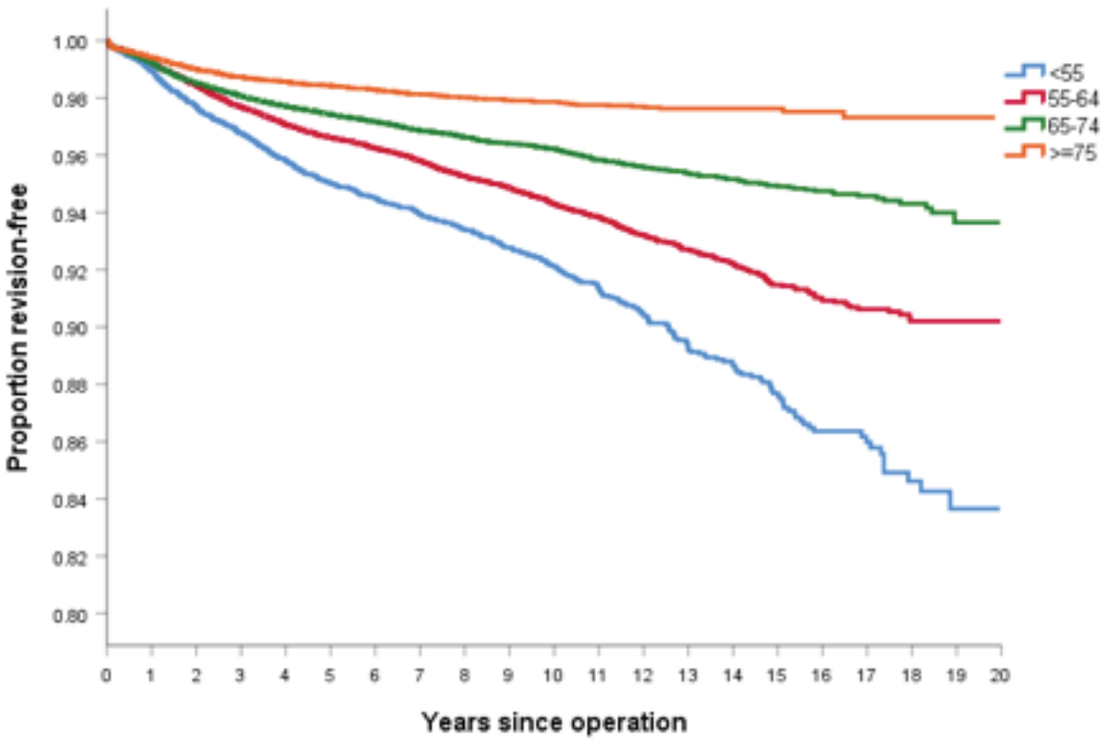
Fixed vs. Mobile knees



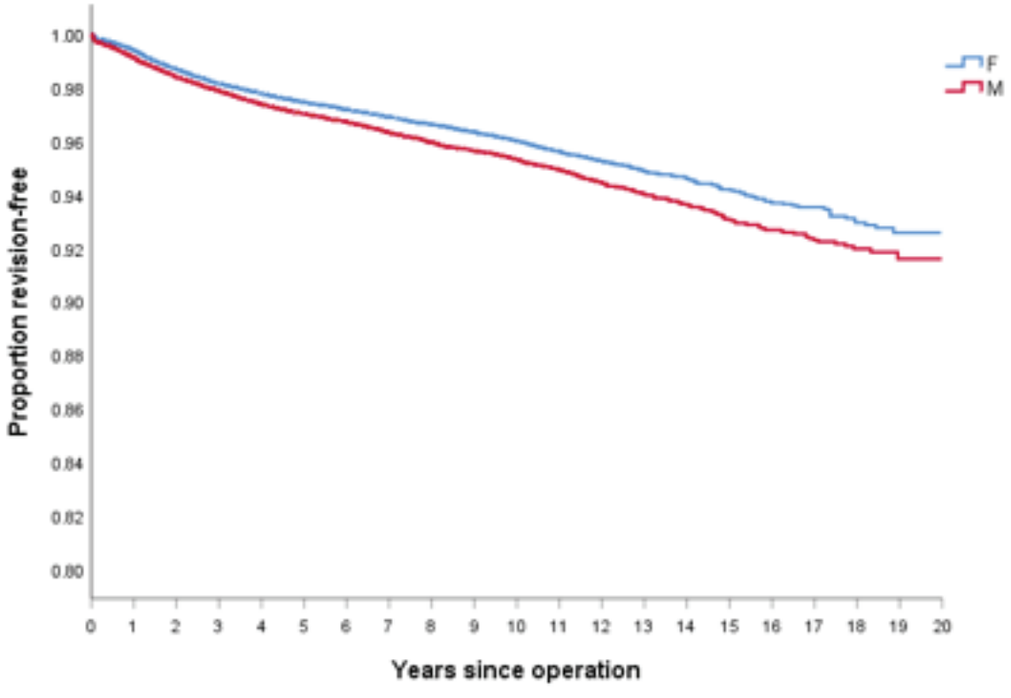
Posterior Stabilised vs. Cruciate Retaining



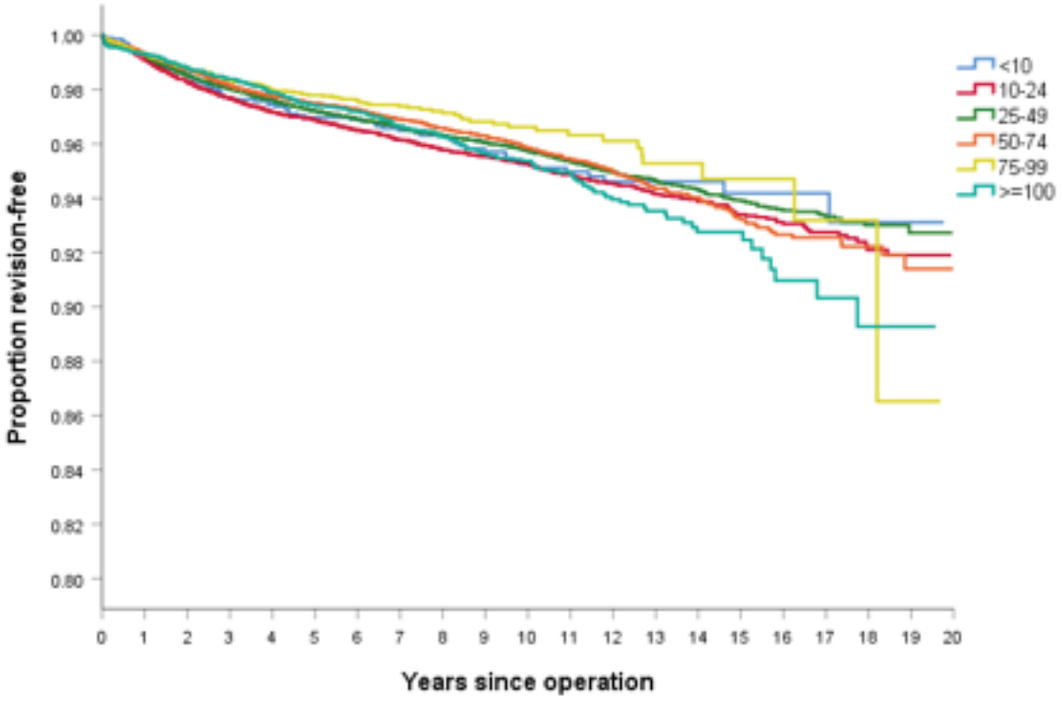
Survival for age bands



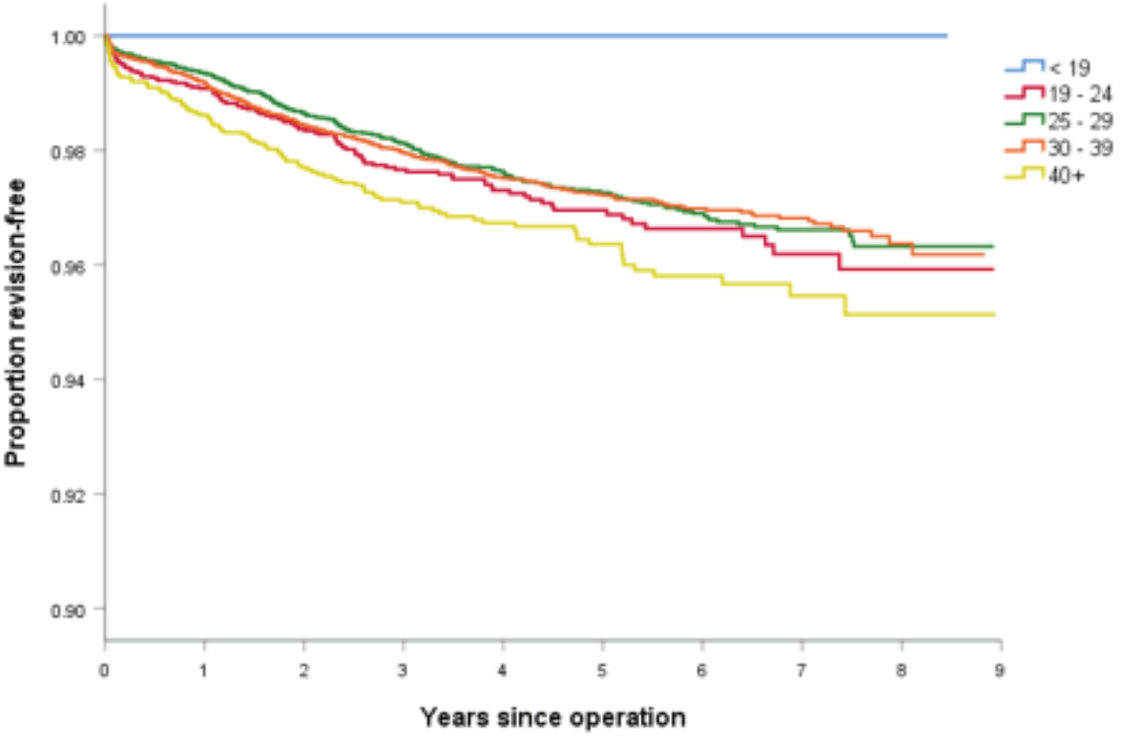
Survival for male vs. female



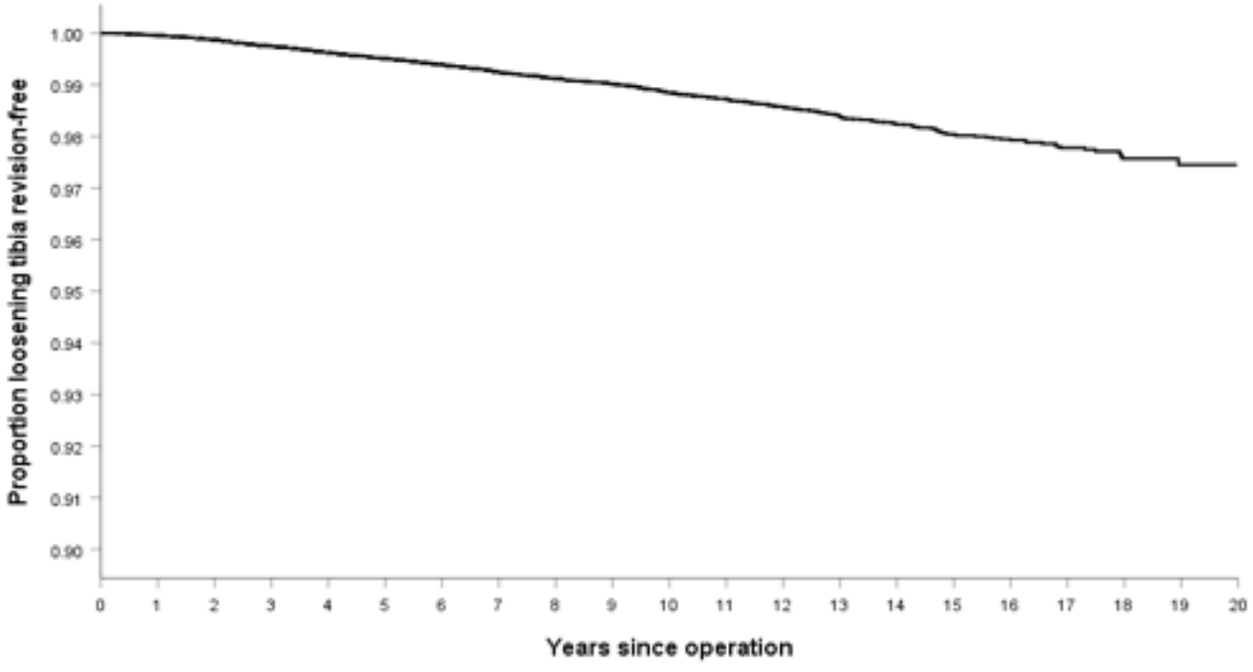
Survival for surgeon annual output



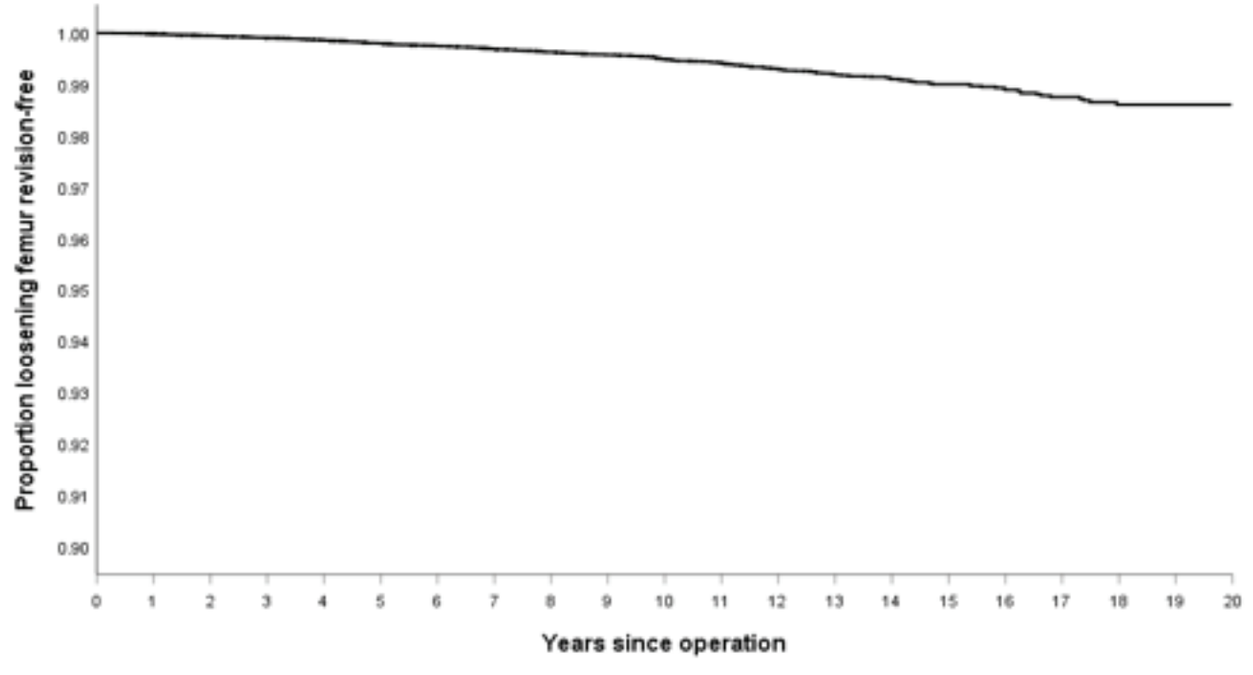
Survival for BMI groups



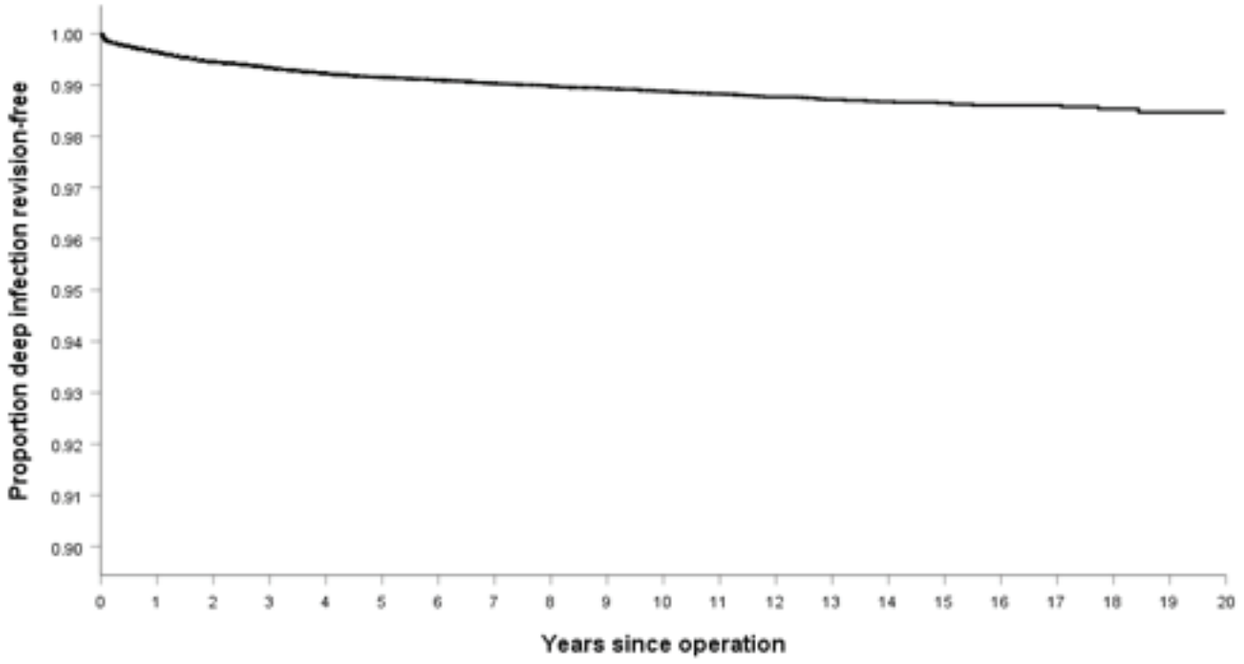
Tibial loosening



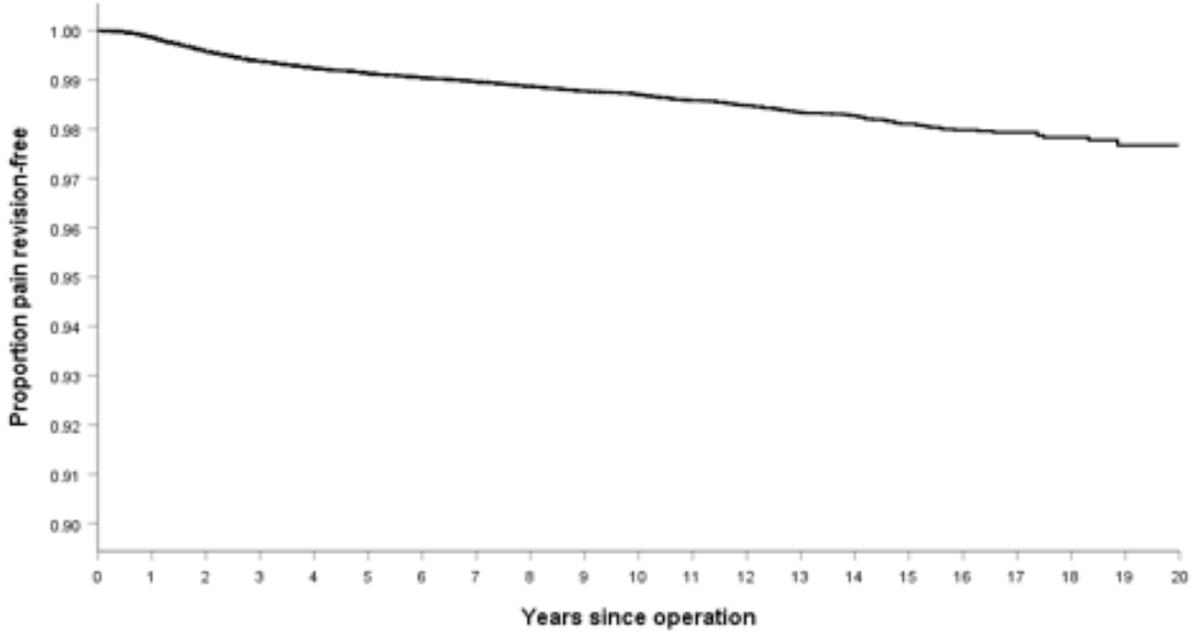
Femoral loosening



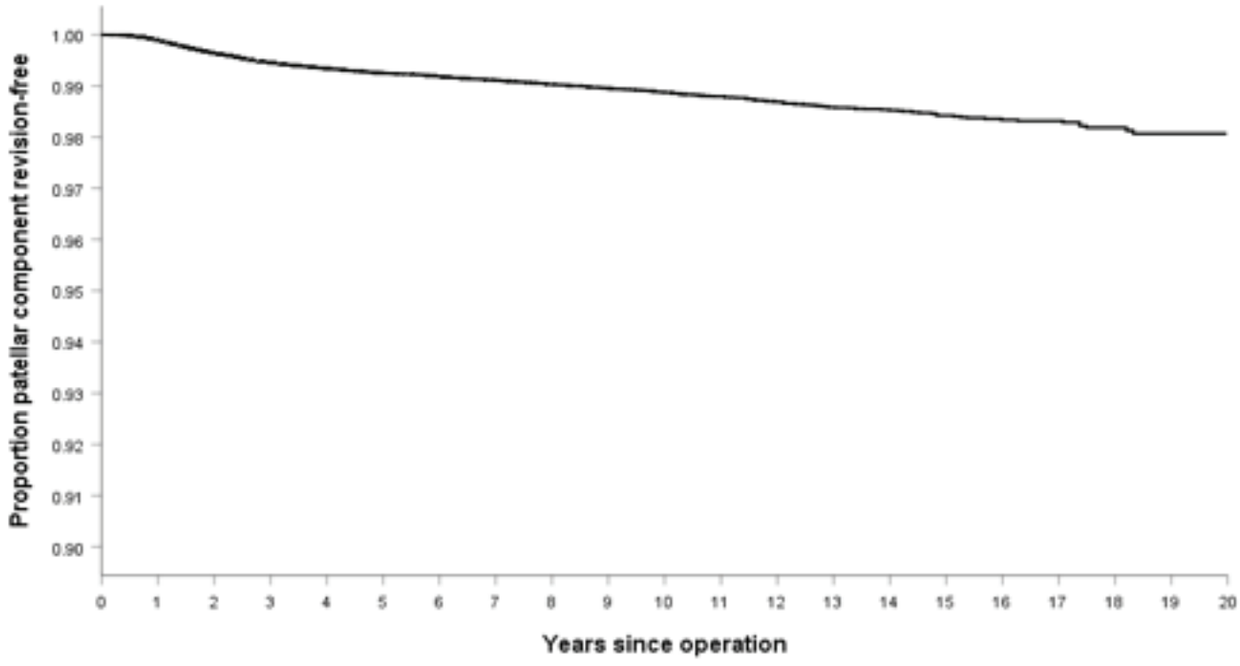
Deep infection

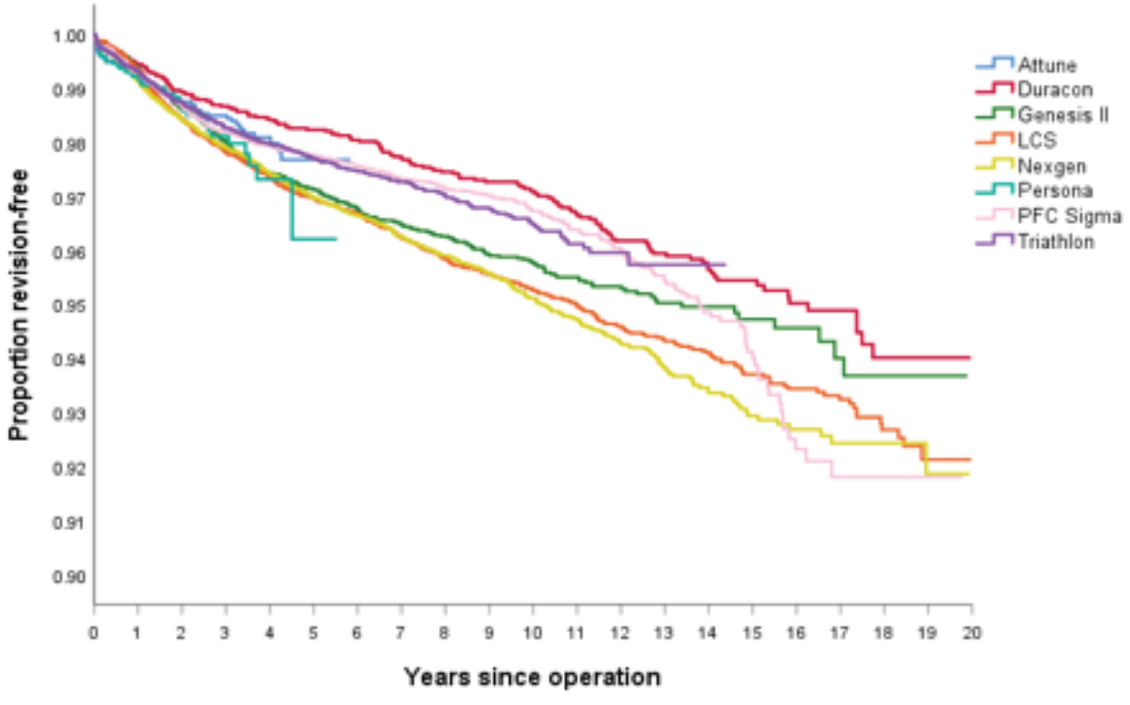


Pain



Patella


Proportion patellar component revision-free
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Years since operation


Proportion revision-free
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Years since operation
Attune
Duracon
Genesis II
LCS
Nexgen
Persona
PFC Sigma
Triathlon

KNEE RE-REVISIONS

Analysis was undertaken of re-revisions. There were 560 registered primary knee revisions that had been revised twice, 121 that had been revised three times, 31 that had been revised four times, 9 that had been revised five times and 3 that had been revised six times.

Second revision

Time between the first and second revision for the 560 knee arthroplasties averaged 876 days, with a range of 1 – 5,398 and a standard deviation of 1,015 days. This compares to an average of 1,514 days between primary and first revision knee arthroplasty.

Reason for revision	
Deep infection	279
Pain	114
Loosening tibial component	79
Loosening femoral component	66
Loosening patellar component	9
Fracture femur	4
Fracture tibia	1

Second Revisions

Number of primary revisions	Observed comp. yrs	Number of second re-revisions	Rate/100 component-years	Exact 95% confidence interval	
3,307	15,433	497	3.22	2.94	3.52

Third revision

The average time between second and third revisions for the 121 knee arthroplasties was 622 days, with a range of 5 – 5,185 and a standard deviation of 683 days.

Fourth revision

The average time between third and fourth revisions for the 31 knee arthroplasties was 598 days, with a range of 10 – 3,136 and a standard deviation of 795 days.

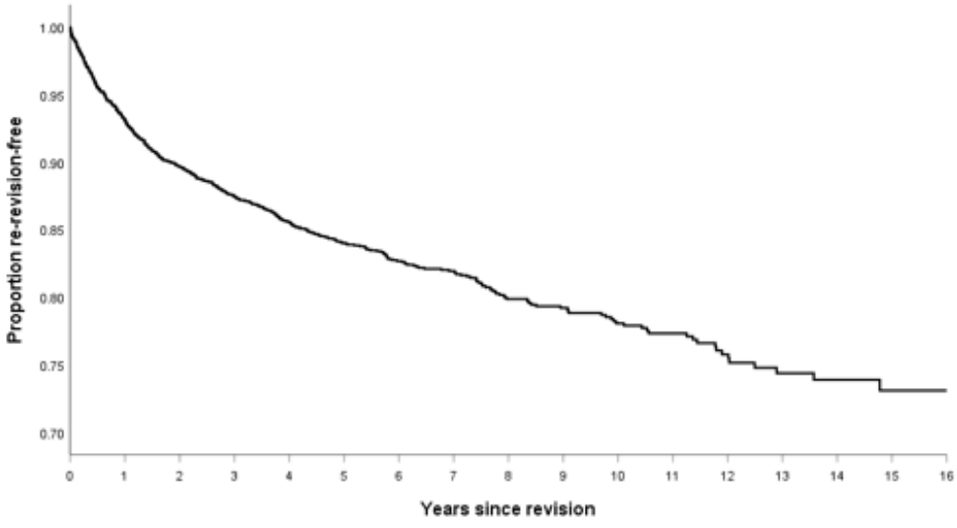
Fifth revision

The average time between fourth and fifth revisions for the 9 knee arthroplasties was 938 days.

Sixth revision

The average time between the fifth and sixth revisions for the 3 knee arthroplasties was 544 days.

KAPLAN MEIER SURVIVAL CURVE FOR FIRST REVISION KNEE ARTHROPLASTIES



Years	Percentage re-revision free	No. in year
1	93.08	3,014
2	89.69	2,552
3	87.47	2,143
4	85.56	1,776
5	84.00	1,472
6	82.67	1,203
7	81.94	1,002
8	79.86	810
9	79.20	640
10	78.05	487
11	77.32	352
12	75.75	247
13	74.36	182
14	73.87	130

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS, FIVE YEARS, TEN YEARS, FIFTEEN YEARS AND TWENTY 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 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 twenty year period and as at July 2019, there were 29,816 primary knee questionnaire responses registered at six months post-surgery.

The average knee score was 37.65 (standard deviation 8.03, range 48 – 0).

Scoring	> 41	11,671
Scoring	34 – 41	10,532
Scoring	27 – 33	4,468
Scoring	< 27	3,663

At six months post-surgery, 75% 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 11,768 individual patients.

At five years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.50.

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 6,572 individual patients.

At ten years post-surgery, 82% of patients achieved an excellent or good score and had an average of 39.96.

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 fifteen years post-surgery.

This dataset represents sequential Oxford knee scores for 2,364 individual patients.

At fifteen years post-surgery, 79% of patients achieved an excellent or good score and had an average of 39.39.

Questionnaires at twenty 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 fifteen years post-surgery.

This dataset represents sequential Oxford knee scores for 128 individual patients.

At twenty years post-surgery, 75% of patients achieved an excellent or good score and had an average of 39.04.

BMI vs Oxford score at six months

BMI	Mean	Standard Error of Mean	Number
< 19	39.67	2.081	15
19 - 24	39.81	0.212	1,087
25 - 29	39.25	0.128	3,109
30 - 39	37.85	0.127	3,821
40+	36.11	0.312	631
Total	**38.47**	**0.081**	**8,663**

Revision knee questionnaire responses

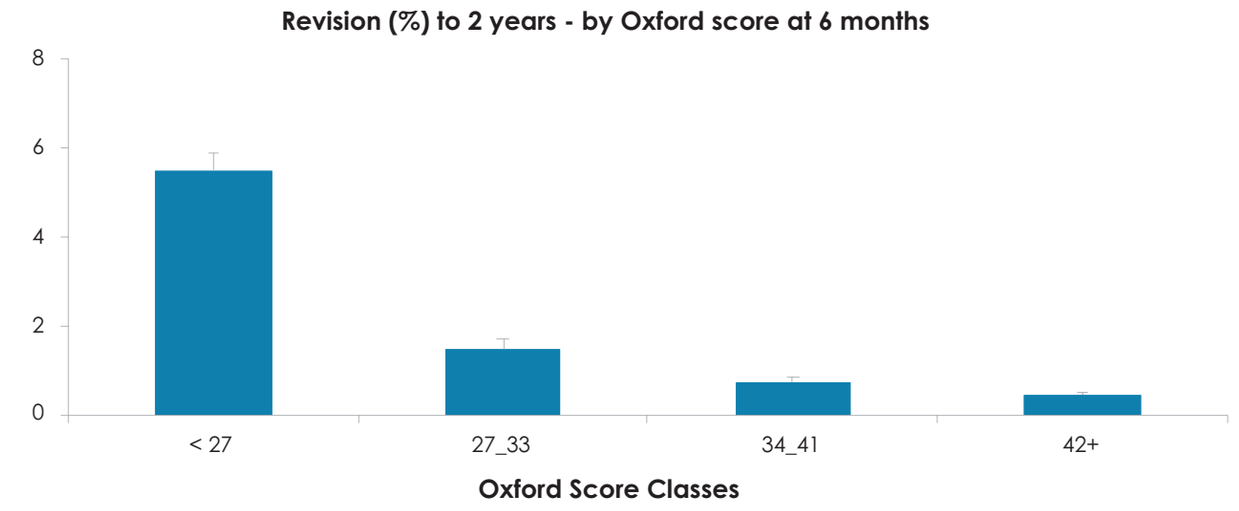
There were 4,714 revision knee responses with 54% achieving an excellent or good score. This group includes all revision knee procedures. The average revision knee score was 32.92 (standard deviation 10.18, range 2 – 48).

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months, five and ten years' post-surgery 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.

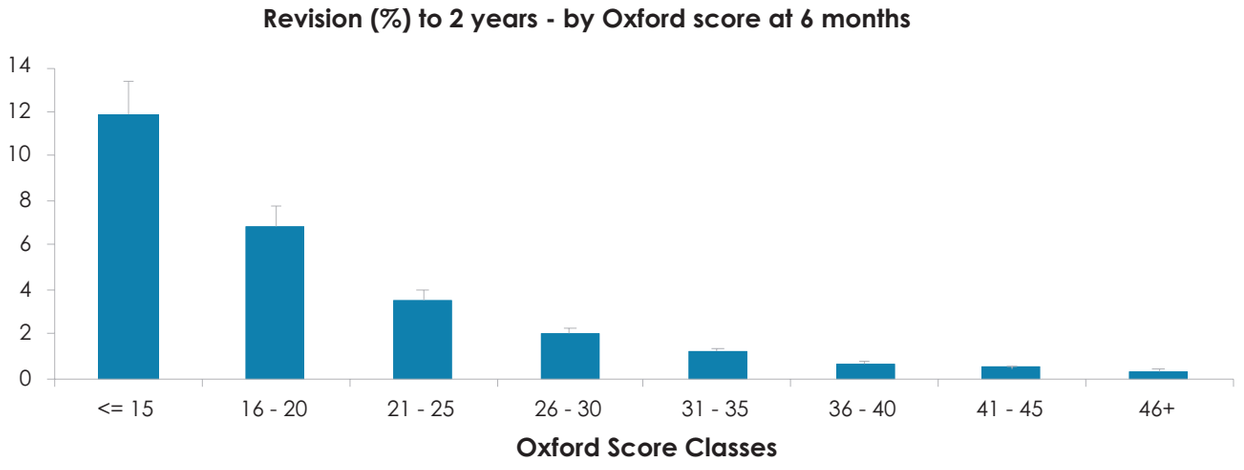


Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	2,804	154	5.49	0.43
27_33	3,949	59	1.49	0.19
34_41	9,283	68	0.73	0.09
42+	10,163	45	0.44	0.07

A person with an Oxford score > 42 has a 0.44 risk of revision within two years compared to a 5.49% risk with a score of 27 or less.

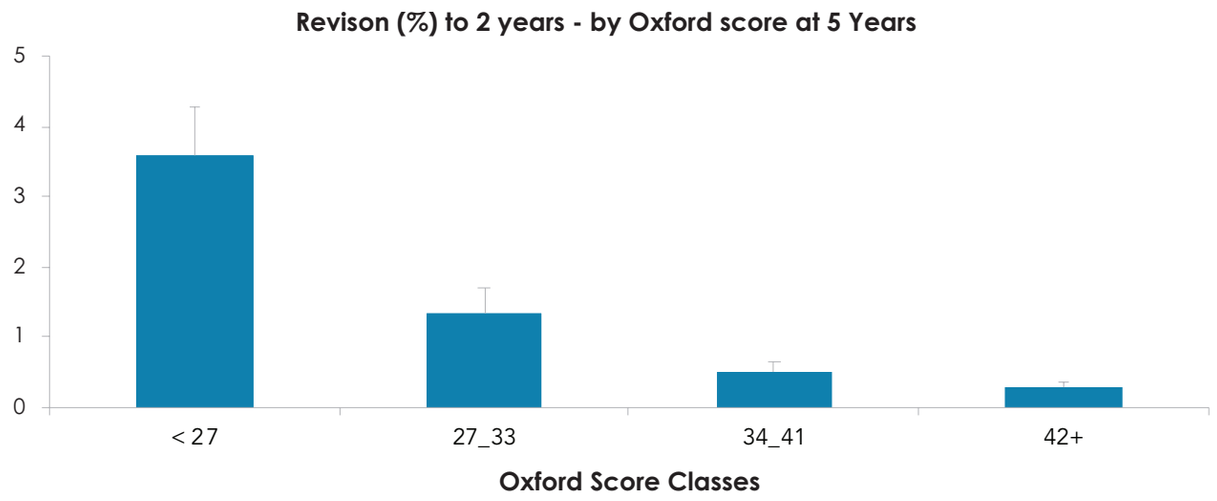
In view of the large number of six month Oxford scores it is possible with statistical significance to further break down the score groupings to demonstrate an even more convincing relationship between score and risk of revision within two years.



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

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 13 times the risk of a revision within two years compared to a person with a score > 41.



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

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	672	24	3.57	0.72
27_33	904	12	1.33	0.38
34_41	2,438	12	0.49	0.14
42+	5,806	16	0.28	0.07

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 10 times the risk of a revision within two years compared to a person with a score >41.

Revision risk versus Kalairajah groupings of Oxford scores within two years of the 10 year score date.

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	368	18	4.89	1.12
27_33	473	11	2.33	0.69
34_41	1,208	6	0.50	0.20
42+	2,648	13	0.49	0.14

A person with an Oxford score of > 41 has a 0.49% risk of revision within two years compared to a 4.89% risk with a score of 27 or less.

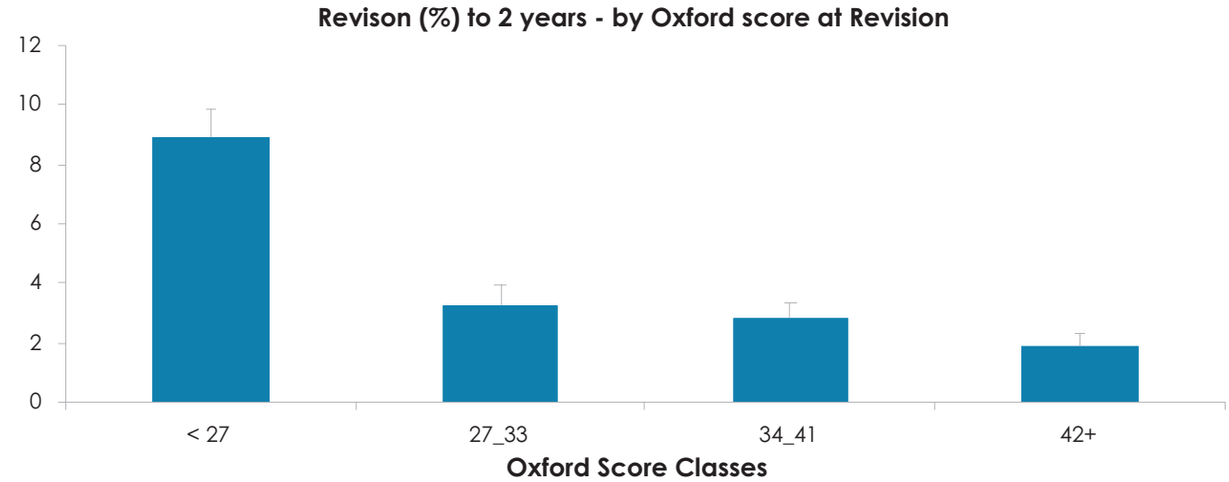
Fifteen year score and revision arthroplasty

As with the six month, five year and ten year scores, plotting the patients' fifteen 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 >41.

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	139	12	8.63	2.38
27_33	135	0	0.00	0.00
34_41	326	1	0.31	0.31
42+	715	6	0.84	0.34

Prediction of second revision from six month score following first revision

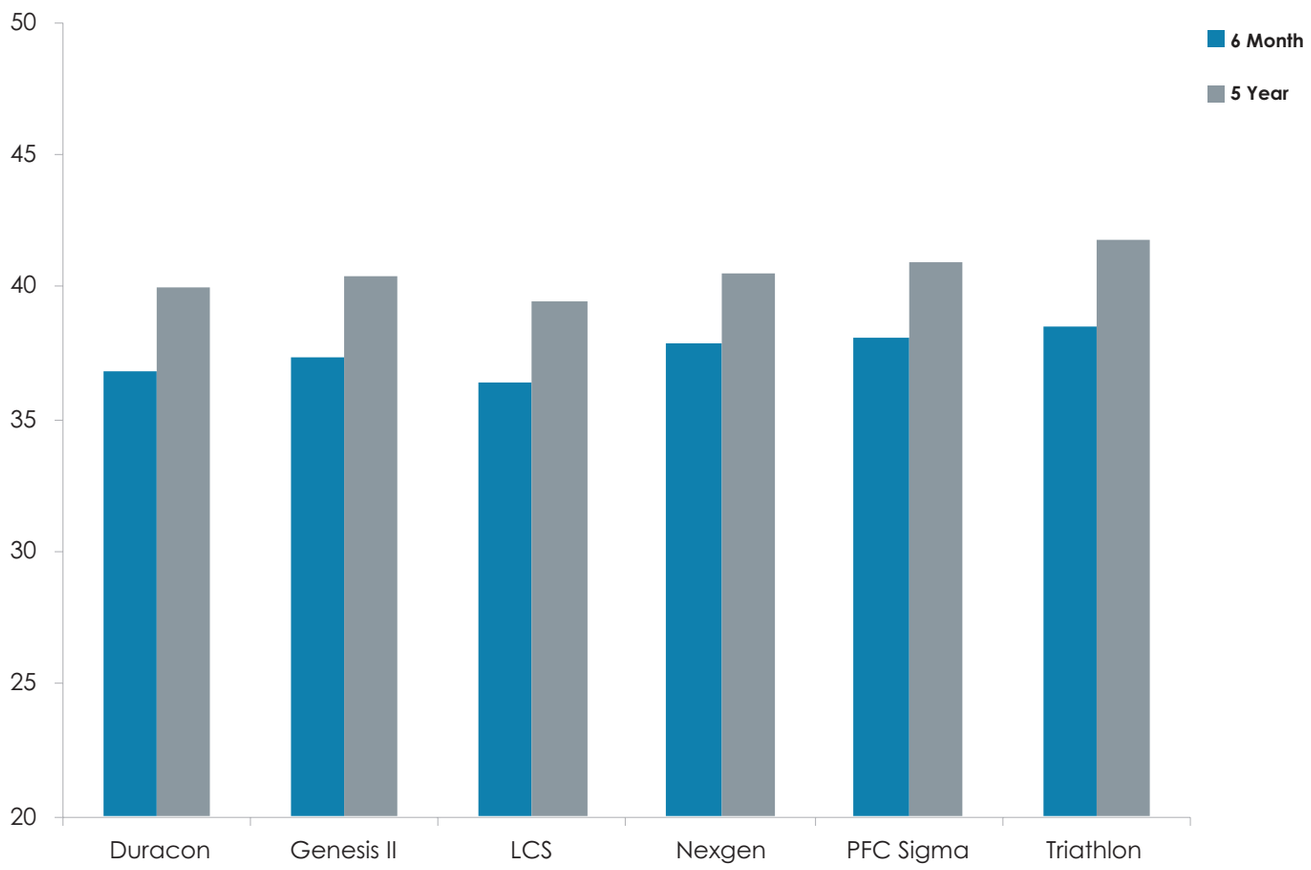
Plotting the patients' six month scores following their first revision in the Kalairajah groupings against the proportion of knees revised for that same group again demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score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



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

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	929	83	8.93	0.94
27_33	698	23	3.30	0.68
34_41	1,080	31	2.87	0.51
42+	921	17	1.85	0.44

Mean Oxford scores at six months and five years for six knee prostheses with minimum of 1,800 registrations



Oxford scores for 6 most common knee prostheses with 6m and 5 years Oxford scores

Oxford Score		Duracon	Genesis II	LCS	Nexgen	PFC Sigma	Triathlon
6 Month	Mean	36.9	37.4	36.4	37.9	38.1	38.5
	Std. Error of Mean	0.2	0.1	0.1	0.1	0.1	0.1
	Number	1,799	3,436	5,677	5,027	2,937	4,334
5 Year	Mean	40.0	40.5	39.5	40.6	41.0	41.8
	Std. Error of Mean	0.3	0.2	0.2	0.2	0.2	0.2
	Number	780	1,642	2,516	2,369	1,570	1,689

UNICOMPARTMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **nineteen year** report analyses data for the period January 2000 – December 2018. There were 12,627 unicompartmental knee procedures registered with an additional 1,096 for 2018.

For the 2018 year the Oxford uncemented medial UKR remains the most commonly used prosthesis with 753 (69%), followed by the Zimmer UK 150 (14%). Smaller numbers of Persona Partial – 62 (5%), the Oxford lateral dome UKR at 59 (5%) and Restoris 45 (4%) are also being implanted.

Data Analysis

Age and sex distribution

The average age for a unicompartmental knee replacement was 66 years, with a range of 18 – 95 years.

	Female	Male
Number	5,773	6,854
Percentage	45.72	54.28
Mean age	65.90	66.28
Maximum age	94.71	94.55
Minimum age	18.28	31.62
Standard dev.	10.16	9.21

Body Mass Index

For the nine- year period 2010 - 2018, there were 5,719 BMI registrations for unicompartmental knee replacements. The average was 29.90 with a range of 16.60 – 59.50 and a standard deviation of 5.00.

Previous operation

None	10,207
Menisectomy	1,871
Ligament reconstruction	76
Osteotomy	48
Internal fixation	34
Synovectomy	5

Diagnosis

Osteoarthritis	12,368
Avascular necrosis	99
Post ligament disruption	61
Rheumatoid arthritis	26
Post fracture	25
Other inflammatory	22
Tumour	2

Approach

Medial	9,445
Minimally invasive surgery	3,017
Lateral	270
Other	216
Image guided surgery	168
Robot assisted	41

Image guided surgery was added to the updated forms at the beginning of 2005, but unlike in total knee arthroplasty, it has never become popular. Robot assisted is reported for the first time in this report.

Cement

Femur cemented	7,960 63%
Antibiotic in cement	5,208 65%
Tibia cemented	8,431 67%
Antibiotic in cement	5,536 66%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	12,190 97%

Operating theatre

Conventional	8,755
Laminar flow	3,736
Space suits	2,932

ASA Class

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

For the fourteen- year period 2005 – 2018, there were 9,706 (97%) unicompartmental knee procedures with the ASA class recorded.

Definitions

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

ASA	Number	Percentage
1	1,843	19
2	6,239	64
3	1,603	16
4	21	1

Operative time (skin to skin)

Mean	73 minutes

Surgeon grade

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

The following figures are for the fourteen year period 2005 – 2018.

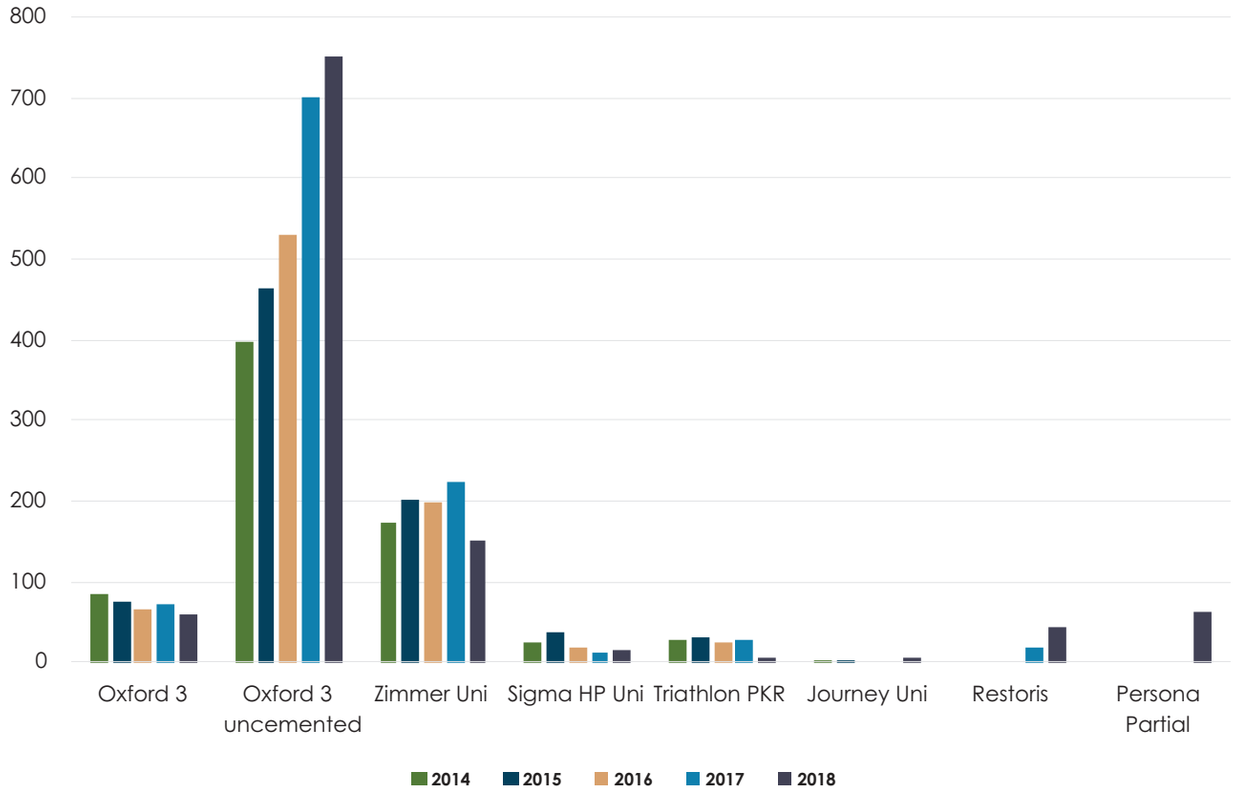
Consultant	9,535
Advanced trainee supervised	440
Advanced trainee unsupervised	63
Basic trainee	16

Prosthesis usage

Unicompartmental knee prostheses used in 2018

Oxford 3 uncemented	753
Zimmer Uni	150
Persona Partial	62
Oxford 3 cemented	59
Restoris	45
Sigma HP Uni	15
Triathlon PKR	7
Journey Uni	5

Most used Unicompartmental prostheses for 5 years (2014 – 2018)



Surgeon and hospital workload

Surgeons

In 2018, 82 surgeons performed 1,096 unicompartmental knee replacements, an average of 13 procedures per surgeon.

25 surgeons performed less than 5 procedures (41 surgeons in 2017), 39 surgeons did 5-15 procedures with 18 surgeons performing more than 15 cases (16-157).

Hospitals

In 2018, unicompartmental knee replacements were performed in 38 hospitals; 21 were public and 17 were private.

REVISION OF REGISTERED PRIMARY UNICOMPARTMENTAL ARTHROPLASTIES

This section analyses the data for revision of unicompartmental knee replacement over the nineteen-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 1038 revisions of the 12,627 registered unicompartmental knee replacements (8%). A further 108 had a second revision, 17 a third revision, 1 a fourth revision and 1 a fifth revision.

839 of the 1038 (81%) were revised to total knee replacements and 199 (19%) were revised to further unicompartmental replacements.

Of the implants that were in common use in 2018, 124 medial Oxford UKR were revised (0.70/100 ocys), 29 Zimmer UKR (0.47/100 ocys), 9 Triathlon PKR (0.88/100 ocys) and 23 lateral dome Oxford UKR (1.67/100 ocys).

The observed revision rate remains higher for the more implanted Oxford compared to the Zimmer UK.

Time to revision

Mean	2,080 days
Maximum	6,703 days
Minimum	4 days
Standard deviation	1,699 days

Reason for revision

Pain	317
Loosening tibial component	181
Loosening femoral	129
Deep infection	38
Fracture tibia	26
Fracture femur	4

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

Analysis of the three main reasons for revision by year after the primary procedure

	Loosening femoral component		Loosening tibial component		Pain	
Years	**Count**	**%**	**Count**	**%**	**Count**	**%**
0	12	9.3	32	17.7	44	13.9
1	22	17.1	36	19.9	66	20.8
2	9	7.0	14	7.7	35	11.0
3	16	12.4	14	7.7	17	5.4
4	5	3.9	10	5.5	30	9.5
5	10	7.8	8	4.4	16	5.0
6	5	3.9	12	6.6	19	6.0
7	11	8.5	9	5.0	16	5.0
8	7	5.4	6	3.3	13	4.1
9	4	3.1	11	6.1	13	4.1
10	8	6.2	6	3.3	13	4.1
11+	20	15.5	23	12.7	35	11.0
Total	**129**		**181**		**317**	

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 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 (CIs) but sometimes significance can apply in the presence of CI overlap.

All Primary Unicompartmental Knee Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
12,627	86,980	1,038	1.20	1.12	1.27

Revision Rate of Individual Unicompartmental Knee Prostheses Sorted Alphabetically

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
EIUS Uni Knee	22	234.8	2	0.85	0.10	3.08
Freedom Active Uni	36	191.3	7	3.66	1.47	7.54
Genesis Uni	359	3,768.7	52	1.38	1.02	1.79
HLS Uni Evolution	1	0.5	1	193.25	4.89	1,076.74
Journey Uni	12	26.5	1	3.77	0.10	20.99
LCS Uni	6	63.6	2	3.15	0.38	11.36
Miller/Galante	710	8,072.3	82	1.02	0.80	1.25
Optetrak Unicondylar Cemented	101	838.9	11	1.31	0.65	2.35
Oxford 3 cemented	4,139	40,162.4	564	1.40	1.29	1.53
Oxford 3 uncemented	4,616	19,018.9	147	0.77	0.65	0.91
Oxford TiNbN coated	1	7.5	0	0.00	0.00	49.50
Oxinium Uni	33	280.5	12	4.28	0.00	7.47
Persona Partial cemented	62	18.5	1	5.40	0.14	30.11
Preservation	484	5,119.5	88	1.72	1.38	2.12
Repicci II	98	1,212.3	23	1.90	1.20	2.85
Restoris MCK	63	40.6	0	0.00	0.00	9.08
Sigma HP Uni	160	649.4	4	0.62	0.17	1.58
Triathlon PKR	232	1,026.7	9	0.88	0.40	1.66
Unix Uni	14	91.4	3	3.28	0.68	9.60
Zimmer Unicompartmental Knee	1,478	6,155.6	29	0.47	0.31	0.67

Oxford 3 uncemented	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Medial Oxford	4,292	17,645.29	124	0.70	0.58	0.84
Lateral Dome Oxford	324	1,375.87	23	1.67	1.06	2.51

Revision vs Arthroplasty Fixation

Fixation	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	7,930	67,396.0	882	1.31	1.22	1.40
Uncemented	4,166	17,009.9	121	0.71	0.59	0.85
Hybrid	531	2,573.8	35	1.36	0.93	1.87

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	1,614	11,169.9	213	1.91	1.66	2.18
55-64	4,307	31,065.2	464	1.49	1.36	1.64
65-74	4,250	29,783.7	260	0.87	0.77	0.99
>=75	2,456	14,961.0	101	0.68	0.55	0.82

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
F	5,773	40,982	535	1.31	1.20	1.42
M	6,854	45,998	503	1.09	1.00	1.19

Revision vs Surgeon Annual Workload

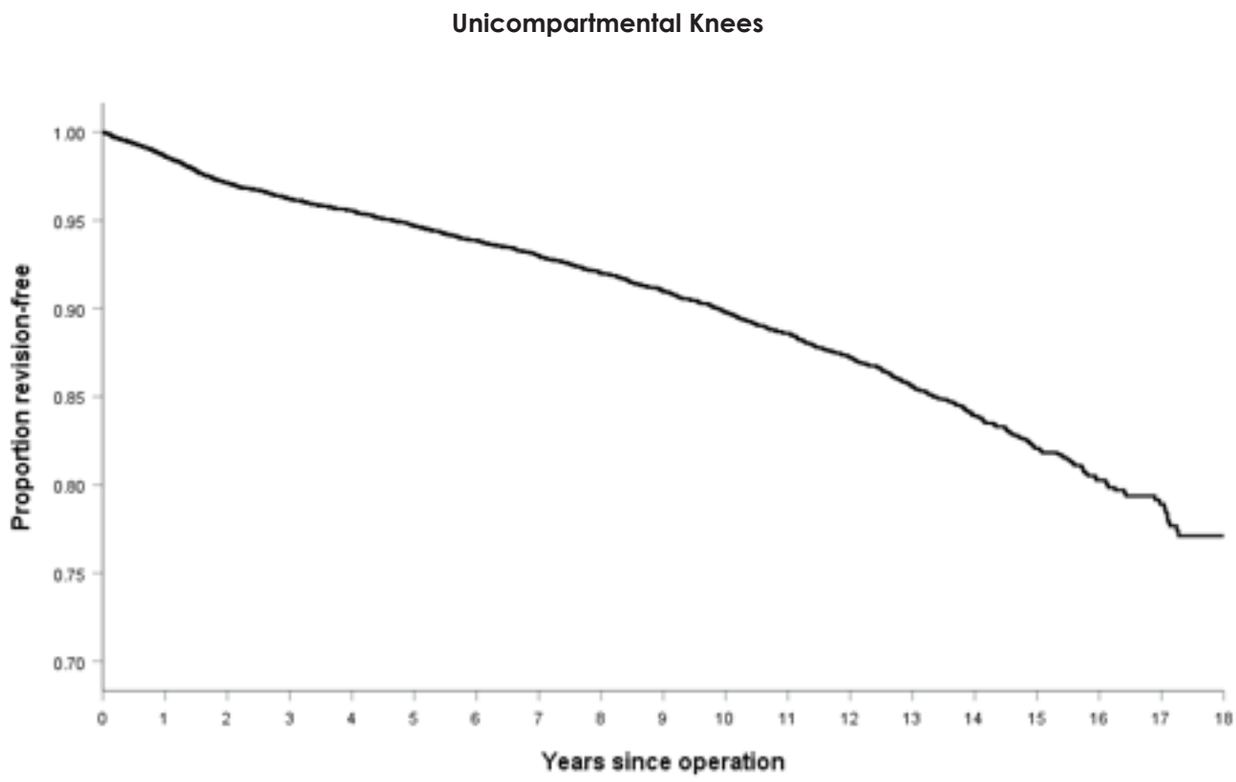
Consultant Number of ops/yr	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	5,449	41,328	574	1.39	1.28	1.51
>=10	7,176	45,641	463	1.01	0.92	1.11

Revision vs Surgical Approach

Approach	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Medial parapatellar	9,445	66,137	837	1.27	1.18	1.35
Lateral parapatellar	270	1,928	31	1.61	1.09	2.28
Not Minimally Invasive	9,610	66,883	853	1.28	1.19	1.36
Minimally Invasive	3,017	20,097	185	0.92	0.79	1.06
Not Image guided	12,459	86,431	1,034	1.20	1.12	1.27
Image guided	168	549	4	0.73	0.00	1.87

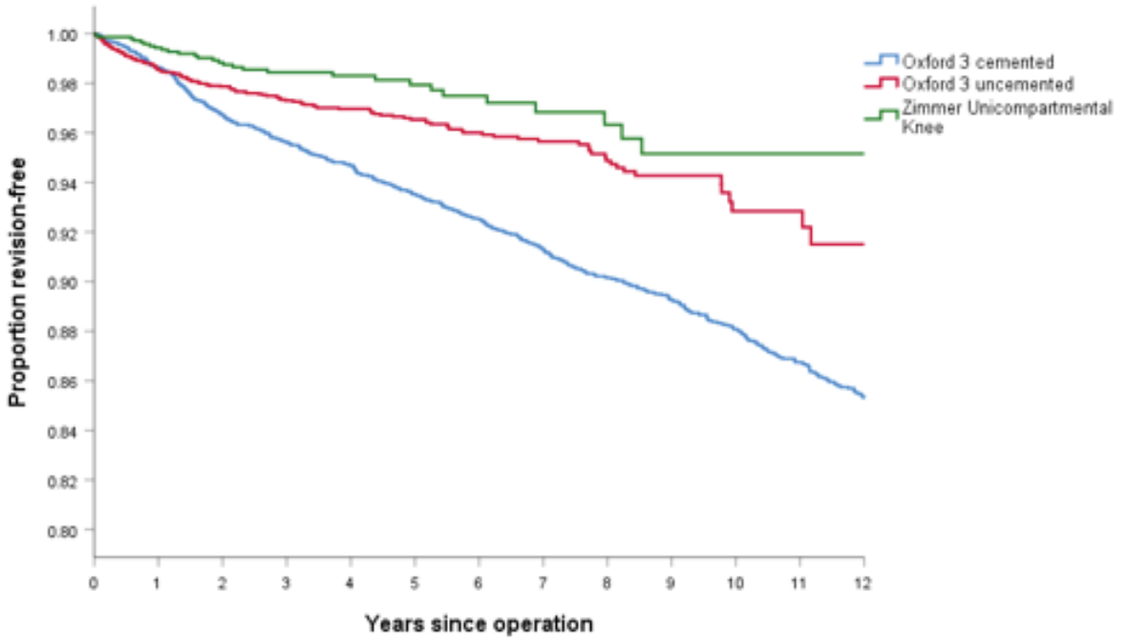
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 19 years from 2000 to 2018, with deceased patients censored at time of death.



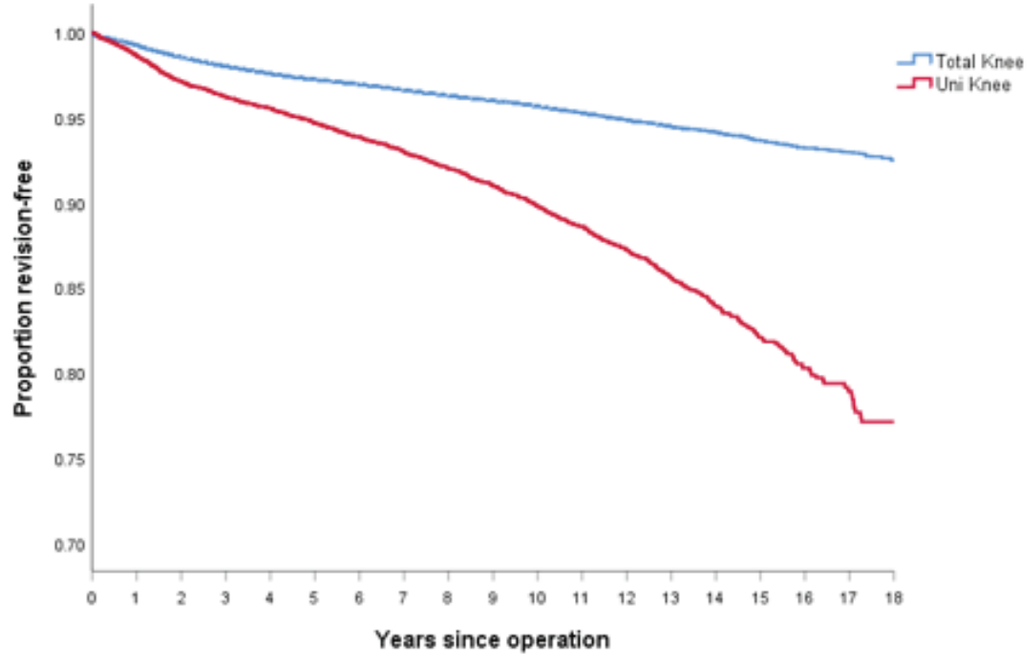
Years	% Revision-free	Number
1	98.6	11,317
2	97.1	10,047
3	96.2	9,019
4	95.6	8,054
5	94.7	7,206
6	93.9	6,361
7	93.0	5,558
8	92.0	4,878
9	91.0	4,193
10	89.8	3,523
11	88.6	2,956
12	87.2	2,407
13	85.6	1,873
14	83.9	1,424
15	82.1	972
16	80.3	611
17	78.9	329

Survival curves for the 3 unicompartmental knees with the biggest number of implantations



Revision Rate for Re-revisions

Re Revisions	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Revised to full	839	4,943.3	66	1.34	1.03	1.70
Revised to Uni	199	859.6	42	4.89	3.52	6.60
All	1,038	5,803.0	108	1.86	1.53	2.25



	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total Knees	110,076	753,723.0	3,652	0.48	0.47	0.50
Uni Knees	12,627	86,979.7	1,038	1.19	1.12	1.27

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

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

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 nineteen year period and as at July 2019, there were 8,166 unicompartmental knee questionnaire responses registered at six months post-surgery. The average unicompartmental knee score was 39.82 (standard deviation 7.15, range 3 – 48).

Scoring > 41	4,221
Scoring 34 - 41	2,595
Scoring 27- 33	857
Scoring < 27	493

At six months post-surgery, 83% 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 3,329 individual patients.

At five years post-surgery, 88% of patients had achieved an excellent or good score and had an average of 41.66.

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 1,730 individual patients.

At ten years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.75.

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 fifteen years post-surgery.

This dataset represents sequential Oxford knee scores for 469 individual patients.

At fifteen years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.48.

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months, five years and ten years 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 18 times the risk of a revision within two years compared to a person with a score of >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

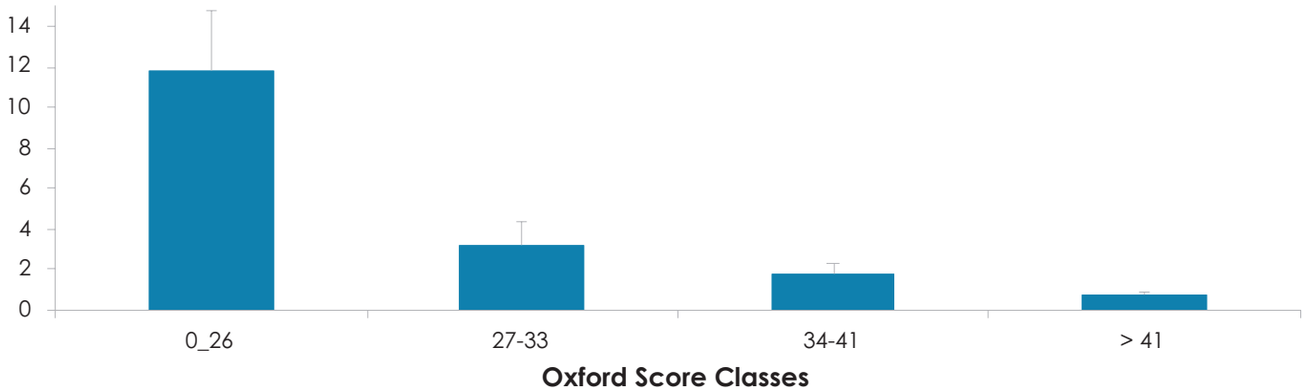
Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
0_26	406	75	18.47	1.93
27-33	720	33	4.58	0.78
34-41	2,126	30	1.41	0.26
> 41	3,323	34	1.02	0.17

A person with an Oxford score >41 has a 1.17% risk of revision within two years compared to an 18.38% risk with a score of < 27.

Five year score and revision arthroplasty

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 17 times the risk of a revision within two years compared to a person with a score of >41.

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

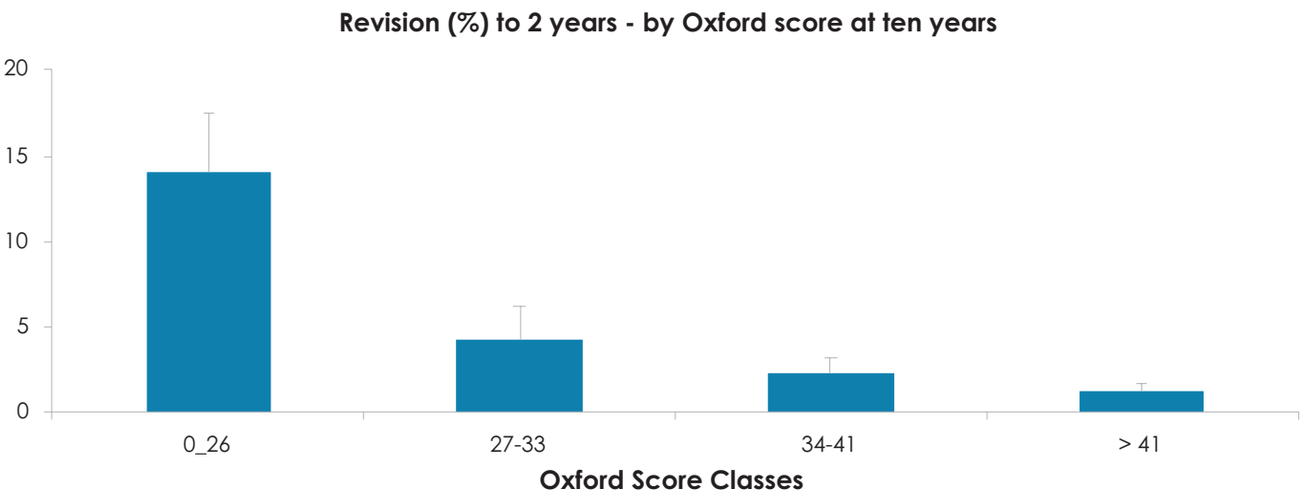


Revision risk versus Kalairajah groupings of Oxford scores within two years of the five year score date

Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
0_26	119	14	11.76	2.95
27-33	191	6	3.14	1.26
34-41	623	11	1.77	0.53
> 41	1,718	12	0.70	0.20

Ten year score and revision arthroplasty

Plotting the patients' ten 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 11 times the risk of a revision within two years compared to a person with a score of >41.



Revision risk versus Kalairajah groupings of Oxford scores within two years of the 10 year score date

Kalairajah group	Revision to 2 yrs	No. revised	%	Std error
0_26	93	13	13.98	3.60
27-33	117	5	4.27	1.87
34-41	266	6	2.26	0.91
> 41	718	9	1.25	0.42

ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **nineteen year** report analyses data for the period January 2000 – December 2018. There were 1,619 primary ankle procedures registered, an additional 117 compared to last year's report.

Data Analysis

Age and sex distribution

The average age for an ankle replacement was 66 years, with a range of 32 – 96 years.

	Female	Male
Number	637	982
Percentage	39.35	60.65
Mean age	64.16	67.78
Maximum age	95.52	90.78
Minimum age	32.32	33.42
Standard dev.	9.79	8.52

Body Mass Index

For the nine year period 2010 - 2018, there were 625 BMI registrations for primary ankle replacements. The average was 28.42 with a range of 17 – 54 and a standard deviation of 4.60.

Previous operation

None	1,291
Internal fixation for juxta articularfracture	153
Arthrodesis	46
Osteotomy	23

Diagnosis

Osteoarthritis	1,237
Post trauma	252
Rheumatoid arthritis	131
Other inflammatory	20
Avascular necrosis	7

Approach

Anterior	1,386
Anterolateral	48
Other	25

Bone graft

Tibia autograft	43
Tibia allograft	3
Tibia synthetic	1
Talus autograft	10
Talus allograft	3

Cement

Tibia cemented	27
Antibiotic in cement	17
Talus cemented	19
Antibiotic in cement	12

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	1,558 (96%)

Operating theatre

Conventional	803
Laminar flow	800
Space suits	310

ASA Class

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

For the fourteen year period 2005 -2018, there were 1,347 (92%) 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	257
2	824
3	261
4	5

Operative time (skin to skin)

Mean	121 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the fourteen-year period 2005 -2018.

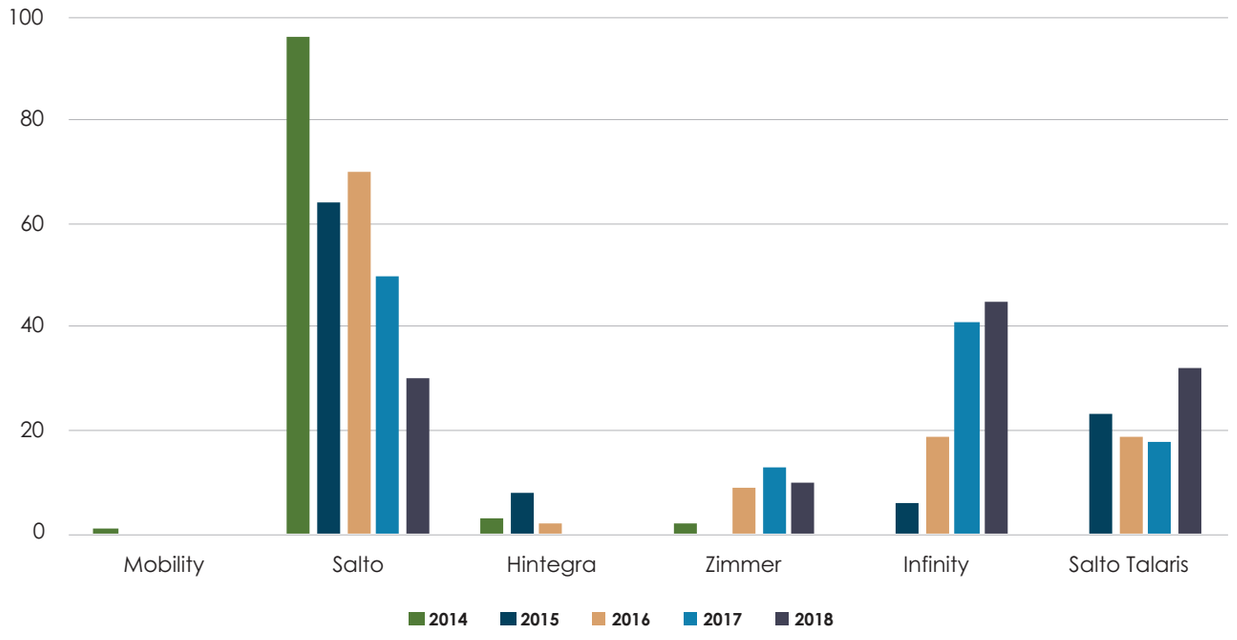
Consultant	1,464
Advanced trainee supervised	11

Prosthesis usage

Ankle prostheses used in 2018

Infinity	45
Salto Talaris	32
Salto	30
Zimmer TM	19

Most Used Ankle Prostheses 2014 – 2018



Surgeon and hospital workload

Surgeons

In 2018, 18 surgeons performed 117 primary ankle procedures. 3 surgeons performed more than 15 procedures and 9 performed <5 procedures.

Hospitals

In 2018, primary ankle replacement was performed in 23 hospitals. 15were public and 8 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 nineteen year period January 2000–December 2018, there were 235 revision ankle procedures registered.

The average age for an ankle revision was 66 years, with a range of 35 – 85.

	Female	Male
Number	90	145
Percentage	38.30	61.70
Mean	64.00	66.71
Maximum age	81.68	85.43
Minimum age	42.13	34.55
Standard dev.	9.33	8.29

REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

This section analyses data for revisions of primary ankle procedures for the nineteen-year period 2000 – 2018.

There were 181 revisions of the primary total ankle procedures of 1,619 (11%).

Time to revision

Average	1,660 days
Maximum	5,173 days
Minimum	21 days
Standard deviation	1,226 days

Reason for revision

Pain	79
Loosening talar component	54
Loosening tibial component	40
Deep infection	17
Dislocation	4
Fracture talus	3

Ankle re-revisions

There were 19 registered primary ankle procedures that were revised twice and 2 procedures that were revised three times.

Analysis of the four main reasons for revision by year after primary procedure

	Loosening talar component		Loosening tibial component		Pain		Deep Infection	
Years	Count	%	Count	%	Count	%	Count	%
0	3	5.6	2	5.0	4	5.1	8	47.1
1	7	13.0	12	30.0	16	20.3	2	11.8
2	8	14.8	3	7.5	10	12.7	2	11.8
3	8	14.8	3	7.5	10	12.7	2	11.8
4	8	14.8	5	12.5	12	15.2	1	5.9
5	4	7.4	1	2.5	5	6.3	0	0.0
6	3	5.6	3	7.5	5	6.3	0	0.0
7	2	3.7	1	2.5	4	5.1	1	5.9
8	2	3.7	4	10.0	4	5.1	0	0.0
9	3	5.6	2	5.0	3	3.8	0	0.0
10	2	3.7	1	2.5	3	3.8	0	0.0
11	2	3.7	2	5.0	3	3.8	1	5.9
12	0	0.0	1	2.5	0	0.0	0	0.0
13	1	1.9	0	0.0	0	0.0	0	0.0
14	1	1.9	0	0.0	0	0.0	0	0.0
Total	**54**		**40**		**79**		**17**	

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 (CIs) but sometimes significance can apply in the presence of CI overlap.

All Primary Ankle Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1,619	10,037.6	181	1.80	1.55	2.09

Revision vs Prosthesis Type Sorted in Alphabetical Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Agility	119	1,320.5	35	2.65	1.85	3.69
Box	6	36.5	2	5.48	0.66	19.80
Hintegra	22	94.7	3	3.17	0.65	9.26
Infinity	111	141.2	2	1.42	0.00	5.12
Mobility	450	3,685.9	68	1.84	1.43	2.34
Ramses	11	97.7	5	5.12	1.66	11.94
Salto	721	3,953.9	53	1.34	1.00	1.75
Salto Talaris	98	192.1	0	0.00	0.00	1.92
STAR	47	465.4	12	2.58	1.33	4.50
Zimmer TM	34	49.7	1	2.01	0.00	11.21

Revision vs Gender

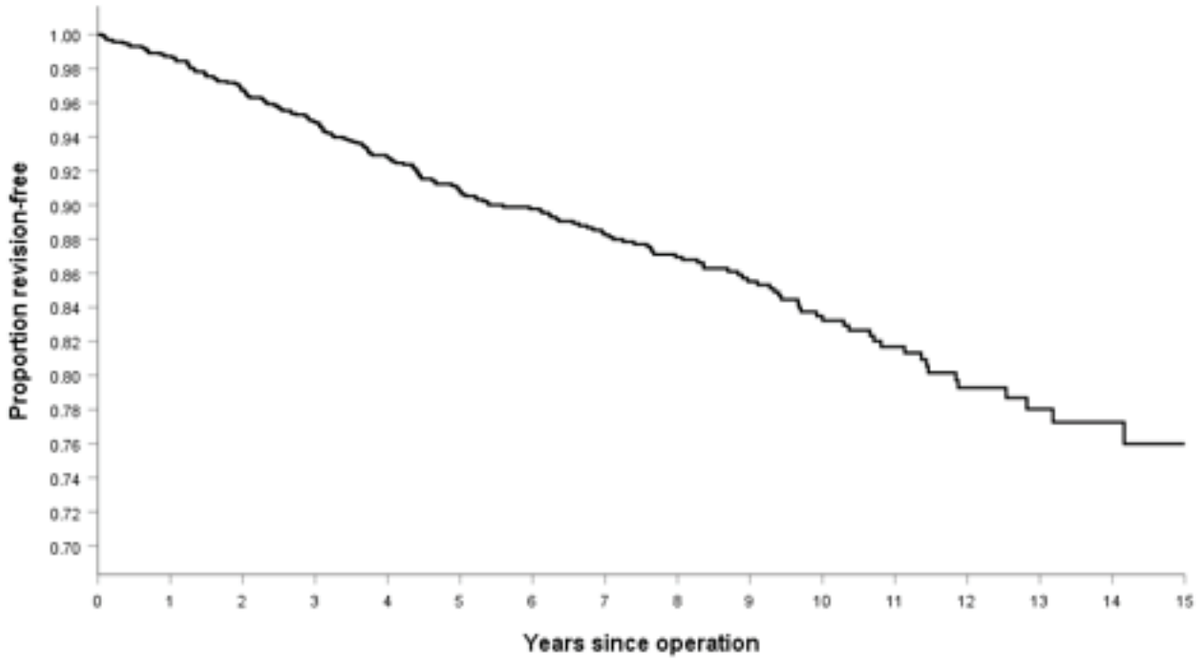
Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	637	3,983.4	71	1.78	1.39	2.25
Males	982	6,054.1	110	1.82	1.49	2.18

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	170	1,138.5	35	3.07	2.14	4.28
55-64	502	3,522.5	81	2.30	1.83	2.86
65-74	661	3,958.6	57	1.44	1.09	1.87
>=75	286	1,417.9	8	0.56	0.24	1.11

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 19 years from 2000 to 2018, with deceased patients censored at time of death.



Years	% Revision-free	No in each year
1	98.7	1,469
2	96.7	1,313
3	94.9	1,156
4	92.8	1,020
5	90.8	894
6	89.8	773
7	88.3	655
8	86.9	552
9	85.5	436
10	83.5	320
11	81.7	230
12	79.3	170
13	78.0	114
14	77.3	66

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS POST-SURGERY

At six months post-surgery patients are sent an outcome questionnaire.

The non -validated ankle questionnaire used previously by the Registry was replaced by the validated Manchester-Oxford Foot Questionnaire towards the end of 2015.

This has 16 questions answered on a 5 point Likert scale, with each item scoring from 0 – 4, with 4 denoting "most severe". Total score range from 0-64

For the 3 year period 2016 – 2018 there were 208 responses.

Average = 16.67, Maximum = 59, Minimum = 0 and Standard deviation = 13.82.

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **nineteen-year** report analyses data for the period January 2000 – December 2018. There were 10,324 primary shoulder procedures registered with an additional 1,066 registered in 2018.

Of the 10,324 shoulder registrations, 1,791 are hemi shoulder replacements, 3,449 are conventional total shoulder replacements, 4,681 are reverse shoulder replacements, 224 are partial resurfacing shoulder replacements, 178 are total resurfacing replacements and 1 is a humeral sphere.

Data Analysis

Age and sex distribution

The average age for all patients with a shoulder arthroplasty was 71 years, with a range of 15 – 99 years.

All shoulder arthroplasty

	Female	Male
Number	6,485	3,839
Percentage	62.81	37.19
Mean age	72.64	68.53
Maximum age	97.71	99.36
Minimum age	15.02	20.13
Standard dev.	9.40	10.15

Hemiarthroplasty

	Female	Male
Number	1,1165	625
Percentage	65.08	34.92
Mean age	71.17	64.63
Maximum age	97.71	99.36
Minimum age	15.02	20.13
Standard dev.	11.52	12.68

Conventional total shoulder arthroplasty

	Female	Male
Number	2,151	1,297
Percentage	62.38	37.62
Mean age	70.35	66.41
Maximum age	95.43	89.11
Minimum age	26.64	29.38
Standard dev.	8.74	8.79

Reverse shoulder arthroplasty

	Female	Male
Number	2,979	1,702
Percentage	63.64	36.36
Mean age	75.31	72.75
Maximum age	96.82	92.65
Minimum age	35.61	34.62
Standard dev.	7.74	7.73

Partial resurfacing arthroplasty

	Female	Male
Number	80	144
Percentage	35.71	64.29
Mean age	58.46	55.86
Maximum age	87.06	86.12
Minimum age	20.70	21.83
Standard dev.	14.39	11.12

Total resurfacing arthroplasty

	Female	Male
Number	109	71
Percentage	60.55	39.45
Mean age	71.17	66.36
Maximum age	86.79	81.51
Minimum age	47.24	23.67
Standard dev.	8.00	9.74

Humeral sphere

One female patient aged 50.11 years.

Previous operation

None	8,656
Rotator cuff repair	661
Internal fixation for Juxta articular fracture	247
Previous stabilisation	210
Arthroscopic debridement	55
Osteotomy	6
Arthrodesis	2

Diagnosis

Osteoarthritis	5,508
Cuff tear arthropathy	2,393
Acute fracture prox. humerus	956
Rheumatoid arthritis	657
Post old trauma	566
Avascular necrosis	204
Post recurrent dislocation	153
Other inflammatory	87

Approach

Deltopectoral	9,907
Other including deltoid split	280

Bone graft

Humeral autograft	121
Humeral allograft	25
Humeral synthetic	4
Glenoid autograft	170
Glenoid allograft	20

Cement

Humerus cemented	1,778
Antibiotic in cement	1,114
Glenoid cemented	2,578
Antibiotic in cement	1,807

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	9,720 (94%)

Operating theatre

Conventional	6,230
Laminar flow	3,959
Space suits	1,779

ASA Class

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

For the fourteen- year period 2005 – 2018 there were 9,342 (97%) 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	764	8
2	5,090	56
3	3,078	34
4	104	2

Operative time (skin to skin in minutes)

	Mean
Hemi Arthroplasty	110
Conventional Total	126
Partial Resurfacing	94
Total Resurfacing	123
Reverse Arthroplasty	112

Surgeon grade

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

The following figures are for the fourteen-year period 2005 – 2018.

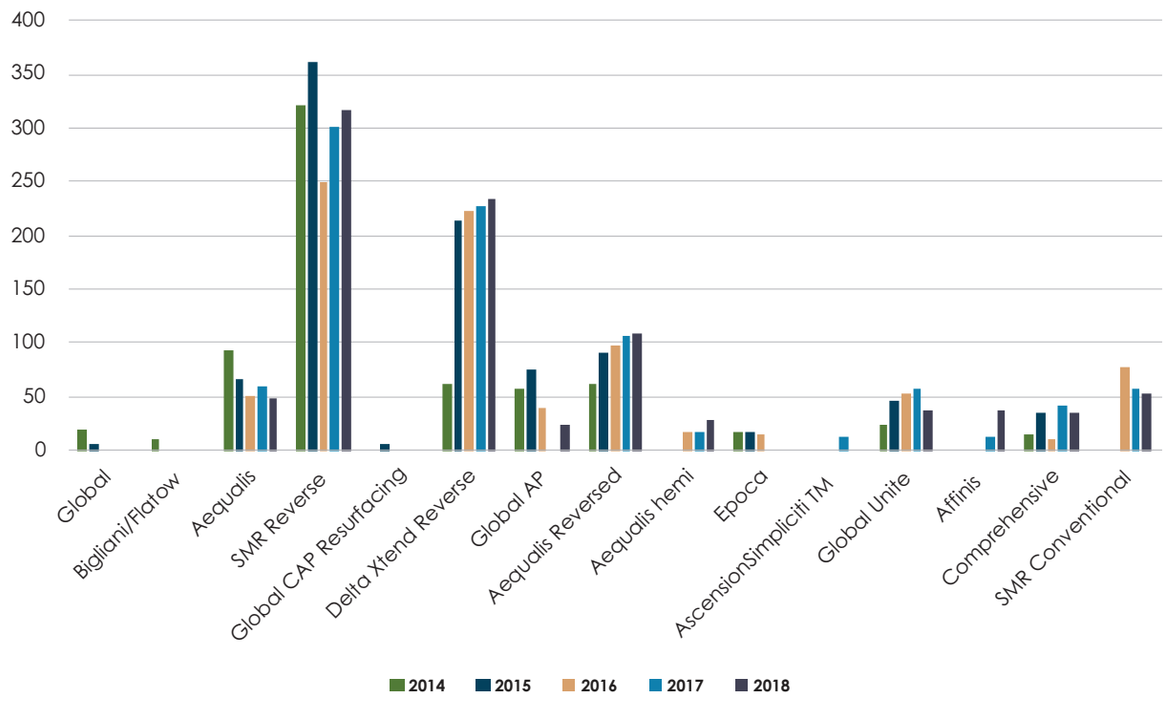
Consultant	8,903
Advanced trainee supervised	53
Advanced trainee unsupervised	22
Basic trainee	5

Top 10 shoulder prostheses 2018

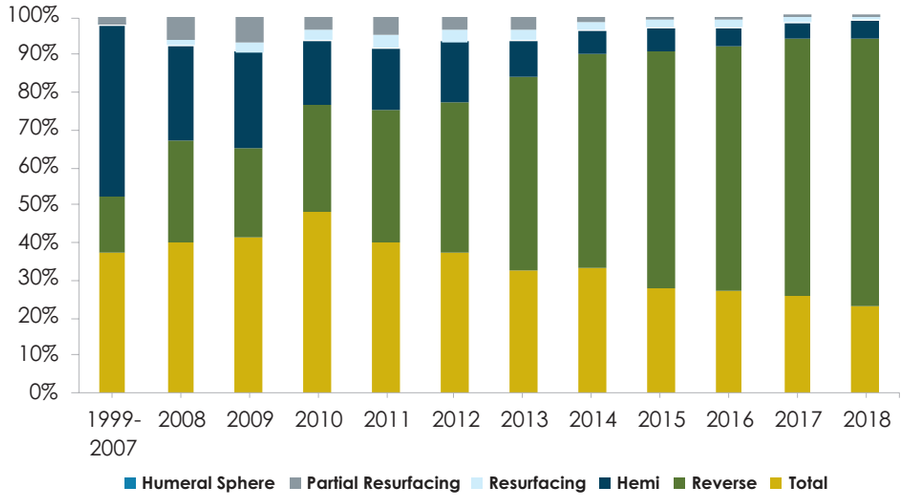
SMR Reverse	317
Delta Xtend Reverse	233
Aequalis reversed	109
SMR conventional	54
Aequalis conventional	48
Global Unite	38
Affinis	38
Comprehensive Reverse	36
Aequalis hemi	29
Global AP	23

Affinis is a new addition to the top 10 with some reshuffling of the order outside the top 3.

Most used shoulder prostheses for five years 2014 - 2018



Percentages of the different types of shoulder prostheses used by year



Surgeon and hospital workload

Surgeons

In 2018, 75 surgeons performed 1,066 shoulder procedures; an average of 14 procedures per surgeon. 19 surgeons performed more than 20 procedures and 8 surgeons each performed 1 procedure.

Hospitals

In 2018, shoulder replacement was performed in 48 hospitals. 27 were public and 21 were private.

For 2018, the average number of shoulder replacements per hospital was 22.

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 nineteen- year period January 2000 – December 2018 there were 817 revision shoulder procedures registered.

The average age for a shoulder revision was 69 years with a range of 24 – 90 years.

	Female	Male
Number	476	341
Percentage	58.26	41.74
Mean	70.40	66.61
Maximum age	89.95	88.46
Minimum age	33.20	24.05
Standard dev.	9.96	10.18

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

This section analyses data for revisions of primary shoulder procedures for the nineteen- year period January 2000 – December 2018.

There were 523 revisions of the primary group of 10,324 (5 %). There were 66 procedures that had been revised twice, 17 that had been revised three times and 4 revised 4 times.

Time to revision

Average	1,142 days
Maximum	5,901 days
Minimum	0 days
Standard deviation	1,165 days

Reason for revision

Pain	108
Sub acromial cuff impingement	80
Dislocation/instability anterior	78
Loosening glenoid	78
Deep infection	41
Loosening humeral	24
Instability posterior	17
Fracture humerus	11
Sub acromial tuberosity impingement.	7
Loosening both	7

Analysis of the six main reasons for revision by year after primary procedure

	Loosening glenoid		Dislocation		Deep infection		Pain		Sub acromial Cuff		Loosening Humeral Component	
0	19	24.4	47	60.3	14	34.1	22	20.4	19	23.8	6	25.0
1	13	16.7	13	16.7	12	29.3	25	23.1	19	23.8	3	12.5
2	8	10.3	3	3.8	5	12.2	17	15.7	13	16.3	2	8.3
3	5	6.4	2	2.6	3	7.3	9	8.3	4	5.0	3	12.5
4	3	3.8	4	5.1	4	9.8	10	9.3	5	6.3	2	8.3
5	5	6.4	4	5.1	1	2.4	4	3.7	7	8.8	3	12.5
6	3	3.8	1	1.3	0	0.0	4	3.7	2	2.5	0	0.0
7	1	1.3	1	1.3	1	2.4	5	4.6	4	5.0	0	0.0
8	2	2.6	2	2.6	0	0.0	3	2.8	1	1.3	1	4.2
9	7	9.0	0	0.0	0	0.0	3	2.8	2	2.5	2	8.3
10	5	6.4	0	0.0	0	0.0	1	0.9	3	3.8	1	4.2
11+	7	9.0	1	1.3	1	2.4	5	4.6	1	1.3	1	4.2
Total	**78**		**78**		**41**		**108**		**80**		**24**	

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 (CIs) but sometimes significance can apply in the presence of CI overlap.

All Total Shoulder Arthroplasties

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
10,324	54,863.6	523	0.95	0.87	1.04

Revision rate of Shoulder Prostheses vs Arthroplasty Type

Operation Type	No. Ops.	Observed	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total	3,449	21,190.9	199	0.94	0.81	1.08
Reverse	4,681	17,168.7	131	0.76	0.64	0.91
Hemi	1,791	13,949.3	154	1.10	0.94	1.29
Resurfacing	178	917.7	5	0.54	0.18	1.27
Partial resurfacing	224	1,631.9	34	2.08	1.44	2.91
Humeral Sphere	1	5.1	0	0.00	0.00	72.75

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

Revision Rate of Individual Shoulder Prostheses Sorted on Alphabetical Order

Operation Type	Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total	Aequalis	576	3141.1	16	0.51	0.28	0.81
	Affinis	76	111.1	0	0.00	0.00	3.32
	Anatomical	35	462.4	1	0.22	0.01	1.20
	Arthrex Eclipse	11	6.1	0	0.00	0.00	60.47
	Ascend TM	2	10.4	0	0.00	0.00	35.49
	Bi-Angular	8	82.5	0	0.00	0.00	4.47
	Bigliani/Flatow	301	2709.7	9	0.33	0.14	0.61
	Cofield 2	21	241.3	0	0.00	0.00	1.53
	Comprehensive	43	89.6	0	0.00	0.00	4.12
	Epoca Humeral stem	4	32.0	0	0.00	0.00	11.51
	Equinoxe Preserve	4	1.4	0	0.00	0.00	258.12
	Global	519	4629.8	24	0.52	0.33	0.77
	Global AP	498	2551.4	8	0.31	0.14	0.62
	Global Icon	3	1.5	0	0.00	0.00	245.42
	Global Unite	195	403.8	3	0.74	0.15	2.17
	Humeral stem	1	6.3	0	0.00	0.00	58.15
	Neer 3	2	28.4	0	0.00	0.00	12.99
	Neer II	12	156.7	1	0.64	0.02	3.56
	Osteonics humeral component	49	512.0	6	1.17	0.37	2.42

Operation Type	Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
	Sidus	1	4.3	0	0.00	0.00	85.28
	Simpliciti TM	41	91.0	1	1.10	0.00	6.12
	SMR	1041	5875.9	130	2.21	1.84	2.62
	Univers 3D	5	40.5	0	0.00	0.00	9.11
	Univers Apex	1	1.6	0	0.00	0.00	229.53
Reverse	Aequalis	346	758.3	7	0.92	0.37	1.90
	Aequalis Reversed	162	550.7	4	0.73	0.20	1.86
	Aequalis Reversed Fracture	43	128.4	0	0.00	0.00	2.87
	Affinis	22	41.2	1	2.43	0.06	13.52
	Arthrex Univers Revers	15	2.6	0	0.00	0.00	140.20
	Comprehensive	150	286.6	1	0.35	0.00	1.94
	Delta	55	500.2	2	0.40	0.05	1.44
	Delta Xtend Reverse	1636	5954.3	55	0.92	0.70	1.20
	Equinoxe Preserve	14	3.9	0	0.00	0.00	95.35
	Global Unite	6	5.0	0	0.00	0.00	73.39
	Mutars	1	0.6	0	0.00	0.00	663.73
	RSP	2	3.8	0	0.00	0.00	95.97
	SMR	2190	8783.3	59	0.67	0.51	0.86
	Trabecular Metal Reverse	38	142.1	2	1.41	0.17	5.08
	Vaios	1	7.7	0	0.00	0.00	47.91
Hemi	Aequalis	239	1394.6	15	1.08	0.58	1.73
	Aequalis Reversed	1	2.4	0	0.00	0.00	153.46
	Affinis	9	25.8	1	3.87	0.10	21.58
	Anatomical	19	246.0	0	0.00	0.00	1.50
	Arthrex Eclipse	3	20.3	0	0.00	0.00	18.18
	Ascend TM	1	6.6	0	0.00	0.00	56.14
	Bi-Angular	19	218.7	2	0.91	0.11	3.30
	Bigliani/Flatow	137	1352.3	15	1.11	0.59	1.78
	Bio-modular	1	7.1	1	14.00	0.35	78.03
	Cofield 2	50	583.1	1	0.17	0.00	0.96
	Comprehensive	3	5.3	0	0.00	0.00	70.25
	Delta	1	8.8	0	0.00	0.00	42.08
	Delta Xtend Reverse	27	110.0	4	3.64	0.99	9.31
	Global	723	6492.7	57	0.88	0.66	1.14
	Global AP	90	466.6	3	0.64	0.09	1.72
	Global Icon	1	0.8	0	0.00	0.00	449.12
	Global Unite	60	173.5	10	5.76	2.76	10.60
	MRS Humeral	4	18.9	0	0.00	0.00	19.47

Operation Type	Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
	Neer II	24	248.7	0	0.00	0.00	1.48
	Osteonics humeral component	43	403.8	2	0.50	0.06	1.79
	Randelli	1	8.2	0	0.00	0.00	44.82
	Simpliciti TM	1	3.4	0	0.00	0.00	107.19
	SMR	332	2138.5	43	2.01	1.46	2.71
	Trabecular Metal Reverse	1	9.2	0	0.00	0.00	39.96
	Univers 3D	1	3.8	0	0.00	0.00	96.59
Total Resurfacing	Aequalis Resurfacing Head	10	71.8	0	0.00	0.00	5.14
	Epoca Head	103	481.3	4	0.83	0.18	1.98
	Global CAP Resurfacing	61	345.7	1	0.29	0.01	1.61
	Hemicap Resurfacing	1	2.7	0	0.00	0.00	135.01
	SMR Resurfacing	3	16.1	0	0.00	0.00	22.93
Partial resurfacing	Aequalis Resurfacing Head	1	3.0	0	0.00	0.00	121.06
	Arthrex Eclipse	3	11.9	2	16.76	2.03	60.55
	Ascension	20	120.7	2	1.66	0.09	5.99
	Copeland Resurfacing	19	166.0	4	2.41	0.66	6.17
	Custom Global Cap	1	7.4	0	0.00	0.00	49.77
	Epoca Head	21	109.8	2	1.82	0.22	6.58
	Global AP CTA Humeral Head	1	0.5	1	188.27	4.77	1048.99
	Global Cap CTA	1	0.5	0	0.00	0.00	677.07
	Global CAP Resurfacing	96	807.1	13	1.61	0.86	2.75
	Global Humeral Head	1	6.2	0	0.00	0.00	59.15
	Hemicap Resurfacing	8	58.0	1	1.72	0.04	9.60
	SMR Resurfacing	45	297.6	7	2.35	0.95	4.85
	SMR Resurfacing CTA	7	43.0	2	4.65	0.56	16.79

Revision vs Glenoid Fixation

(Conventional Total arthroplasties only)

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Uncemented	995	6,041.9	124	2.05	1.71	2.45
Cemented	2,453	15,150.4	75	0.50	0.39	0.62

Revision vs Prosthesis Group vs Age Bands

Prosthesis	Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total	<55	219	1,180.1	25	2.12	1.37	3.13
	55-64	841	5,077.6	74	1.46	1.14	1.83
	65-74	1,517	9,501.5	74	0.78	0.61	0.98
	>=75	871	5,433.1	26	0.48	0.31	0.70
Reverse	<55	55	135.4	3	2.22	0.31	5.91
	55-64	500	1,801.5	26	1.44	0.92	2.08
	65-74	1,802	6,577.3	55	0.84	0.63	1.09
	>=75	2,324	8,654.5	47	0.54	0.40	0.72
Hemi	<55	237	1,809.8	28	1.55	1.01	2.20
	55-64	365	2,986.0	56	1.88	1.40	2.42
	65-74	538	4,567.0	44	0.96	0.70	1.29
	>=75	650	4,581.9	26	0.57	0.37	0.83
Resurfacing	<55	8	36.0	1	2.78	0.07	15.50
	55-64	44	246.3	1	0.41	0.01	2.26
	65-74	82	410.8	3	0.73	0.15	2.13
	>=75	46	227.9	0	0.00	0.00	1.62
Partial resurfacing	<55	92	680.1	16	2.35	1.34	3.82
	55-64	72	558.1	9	1.61	0.74	3.06
	65-74	47	313.8	8	2.55	1.10	5.02
	>=75	13	80.0	1	1.25	0.03	6.96

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	612	3,846.4	73	1.90	1.49	2.39
55-64	1,822	10,669.5	166	1.56	1.32	1.81
65-74	3,986	21,370.4	184	0.86	0.74	0.99
>=75	3,904	18,977.4	100	0.53	0.43	0.64

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	6,485	35,033.5	308	0.88	0.78	0.98
Males	3,839	19,830.1	215	1.08	0.94	1.24

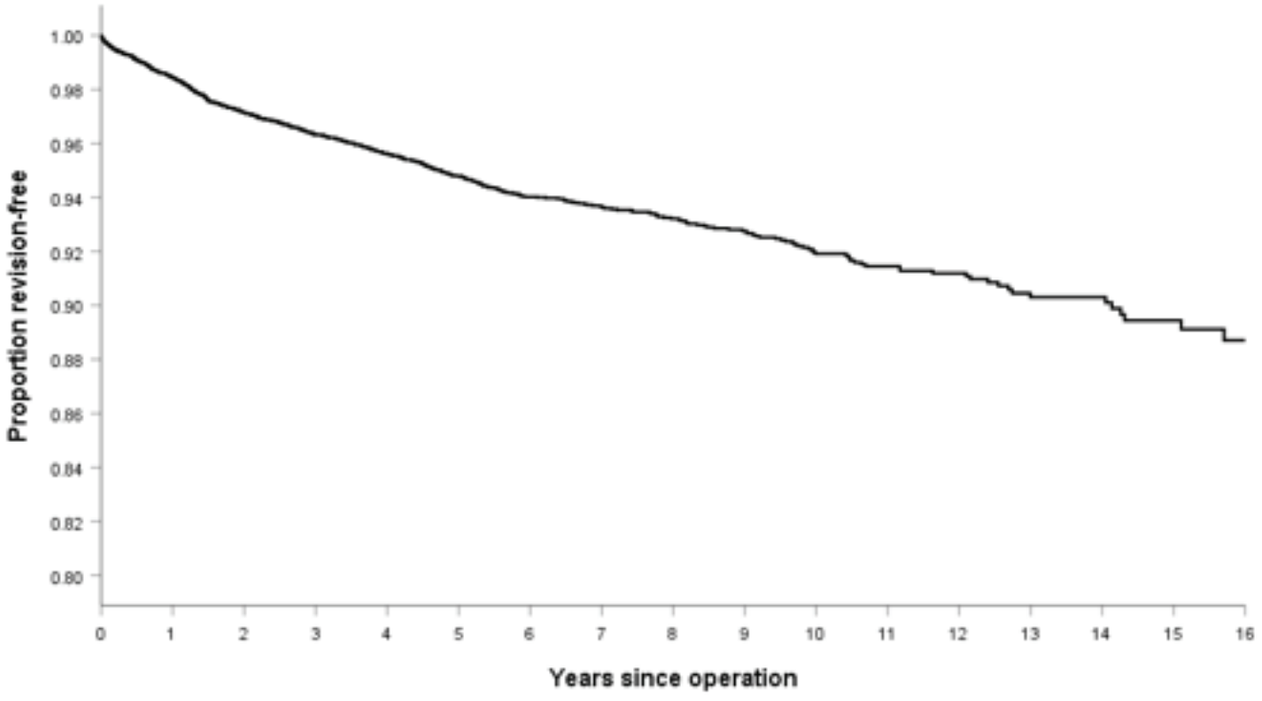
Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	3,804	21,332.1	220	1.03	0.90	1.17
>=10	6,520	33,531.5	303	0.90	0.80	1.01

KAPLAN MEIER CURVES

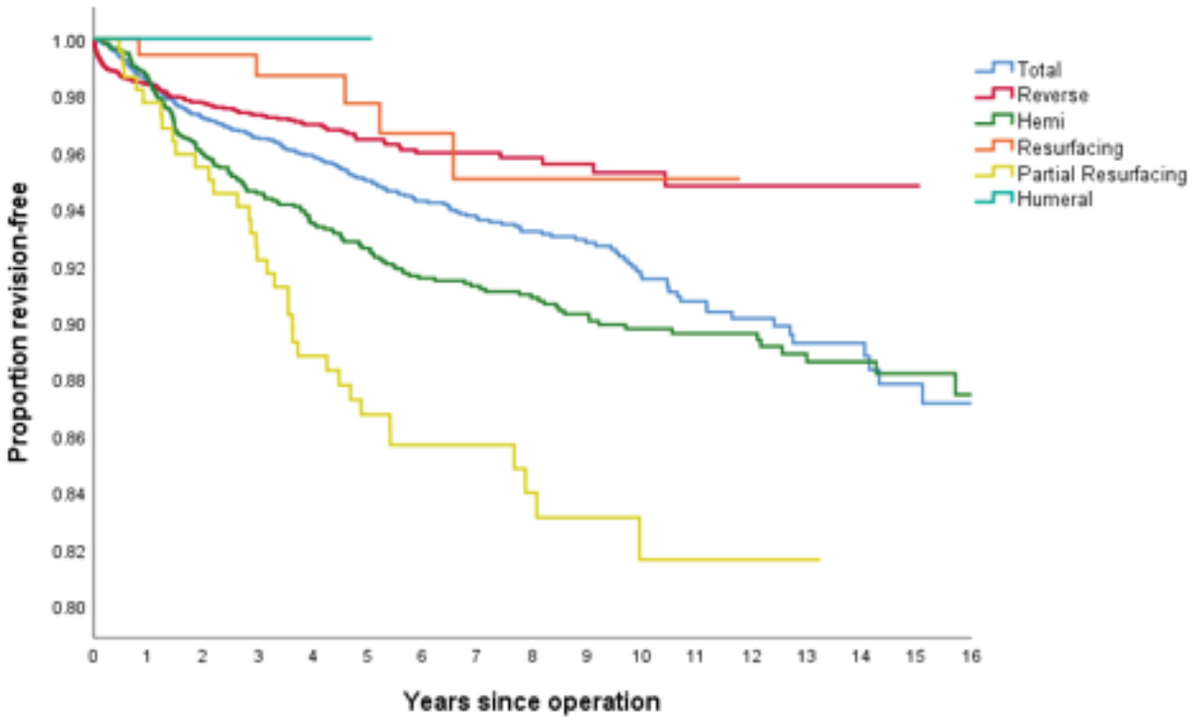
The following Kaplan Meier survival analyses are for the 19 years from 2000 to 2018, with deceased patients censored at time of death.

All Shoulders



Years	% Revision-free	Number
1	98.4	8,990
2	97.2	7,741
3	96.3	6,606
4	95.6	5,468
5	94.8	4,550
6	94.0	3,745
7	93.7	3,031
8	93.2	2,477
9	92.8	2,002
10	91.9	1,566
11	91.4	1,189
12	91.2	870
13	90.3	615
14	90.3	446
15	89.4	292
16	88.7	175

Survival curves for different shoulder categories



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

Questionnaires at six months post-surgery

At six months post-surgery patients are sent the Oxford-12 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 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 nineteen year period and as at July 2019, there were 6,564 shoulder questionnaire responses registered at six months post-surgery.

The average shoulder score was 36.48 (standard deviation 9.40, range 2 – 48)

Scoring	> 41	2,438
Scoring	34 - 41	2,122
Scoring	27 - 33	971
Scoring	<27	1,033

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 2,131 individual patients.

At five years post-surgery, 80% of these patients achieved an excellent or good score and had an average of 39.90.

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 674 individual patients.

At ten years post-surgery, 77% of these patients achieved an excellent or good score and had an average of 39.11.

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 ten years post-surgery.

This dataset represents sequential Oxford shoulder scores for 131 individual patients.

At fifteen years post-surgery, 77% of these patients achieved an excellent or good score and had an average of 39.14.

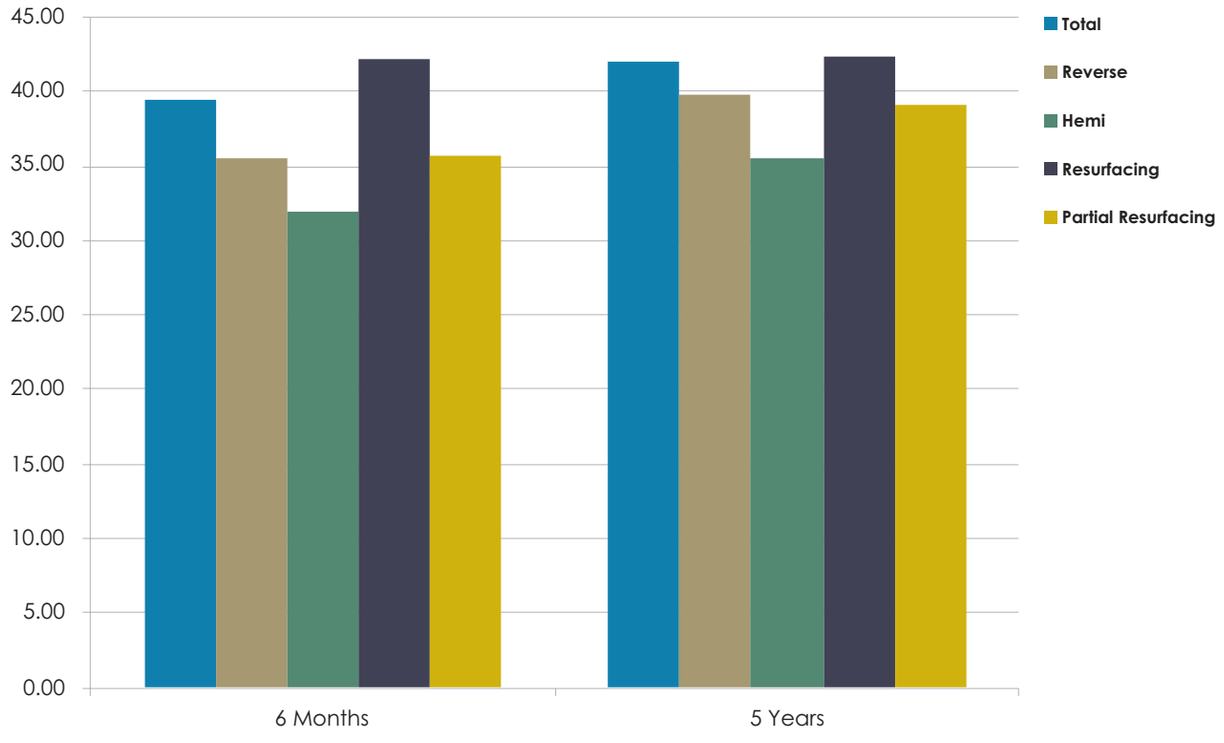
Revision shoulder questionnaire responses

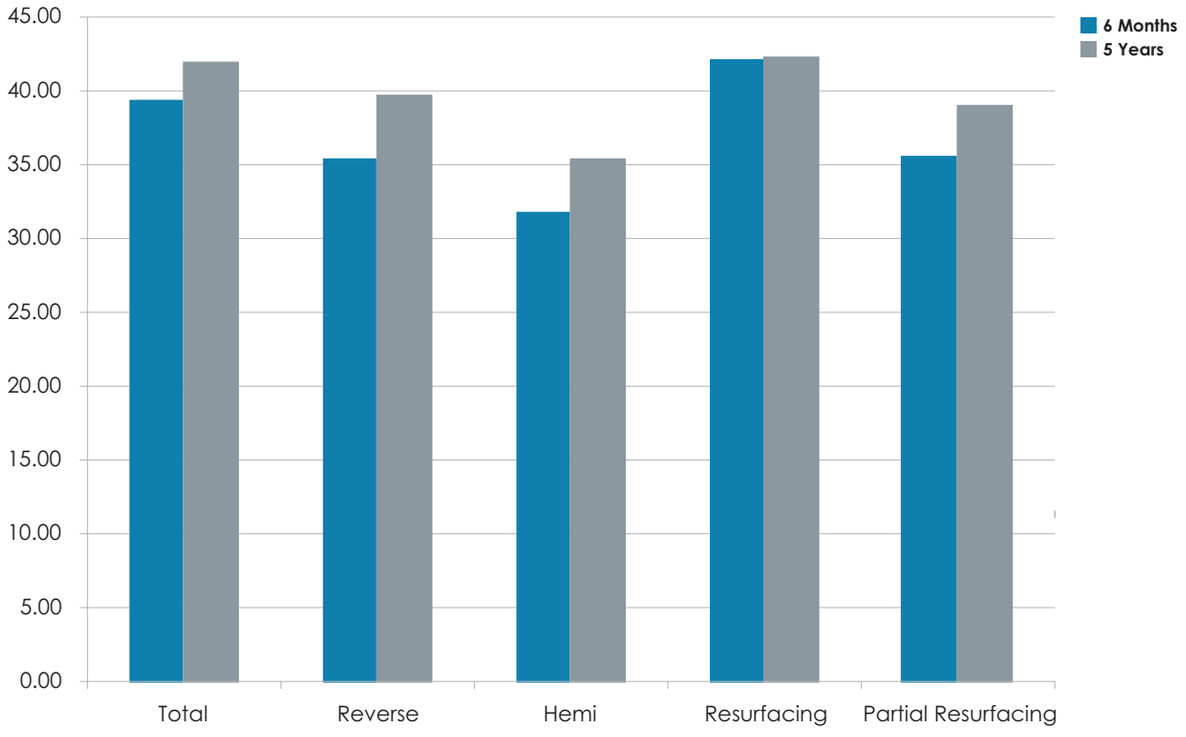
There were 428 revision shoulder responses with 46% achieving an excellent or good score. This group includes all revision shoulder responses. The average revision shoulder score was 30.93 (standard deviation 10.57 range 3 – 48).

Six Month and Five Year Oxford Scores for the different arthroplasty types

Prosthesis type	Time Post-Surgery	Mean Score	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Total	6 Months	39.51	0.17	39.18	39.84
	5 Years	42.07	0.25	41.59	42.55
Reverse	6 Months	35.51	0.18	35.17	35.86
	5 Years	39.75	0.33	39.10	40.41
Hemi	6 Months	31.86	0.30	31.27	32.46
	5 Years	35.56	0.45	34.67	36.46
Resurfacing	6 Months	42.22	0.45	41.32	43.11
	5 Years	42.36	1.14	40.07	44.65
Partial Resurfacing	6 Months	35.65	0.84	33.99	37.31
	5 Years	39.16	1.21	36.73	41.58

Comparison of six month and five year scores for different arthroplasty types



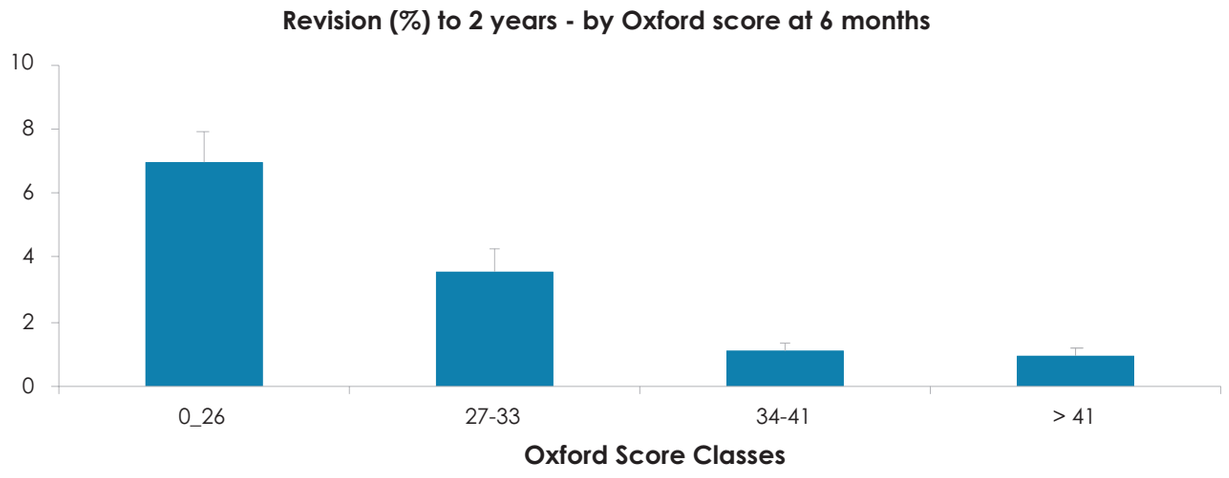

45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Total
Reverse
Hemi
Resurfacing
Partial Resurfacing
6 Months
5 Years

OXFORD 12 SCORE AS A PREDICTOR OF SHOULDER ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months and five years 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. A patient with a score below 27 has 7 times the risk of a revision within two years compared to a person with a score of >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	773	54	6.99	0.92
27-33	757	27	3.57	0.67
34-41	1,581	17	1.08	0.26
> 41	1,874	18	0.96	0.23

Five year score and revision arthroplasty

Plotting the patients' five year 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 3 times the risk of a revision within two years compared to a person with a score of >41.

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

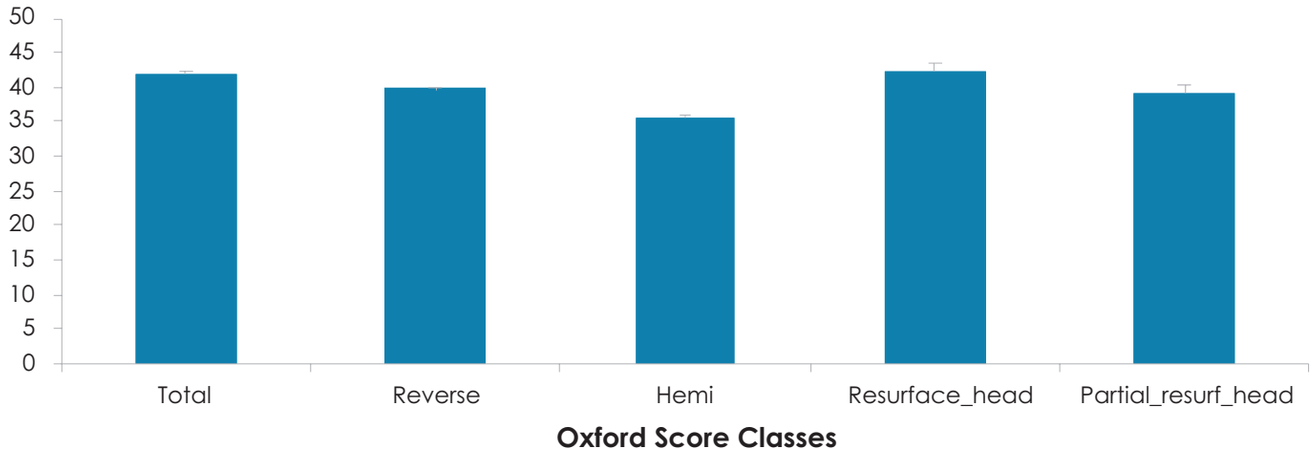
Kalairajah group	No in group	No. revised	%	Std error
0_26	126	2	1.59	1.11
27-33	178	5	2.81	1.24
34-41	327	2	0.61	0.43
> 41	828	4	0.48	0.24

A person with an Oxford score >41 has a 0.17% risk of revision within two years compared to a 2.24% risk with a score 27-33.

Oxford score at 6 months by shoulder operation

Operation types	No. of operations	Mean	Std. Error	95% confidence interval	
Total	2,340	39.5	0.2	39.1	39.9
Reverse	2,903	35.5	0.2	35.2	35.8
Hemi	1,076	31.9	0.3	31.3	32.4
Resurfacing head	130	42.2	0.8	40.7	43.8
Partial resurfacing head	114	35.6	0.8	34.0	37.3
Total	**6,564**	**36.5**	**0.1**	**36.3**	**36.7**

Oxford score at 5 Years by shoulder operation



Operation types	No. of operations	Mean	Std. Error	95% confidence interval	
Total	936	42.1	0.3	41.5	42.6
Reverse	630	39.8	0.3	39.1	40.4
Hemi	467	35.6	0.4	34.8	36.3
Resurfacing head	47	42.4	1.2	40.0	44.8
Partial resurfacing head	51	39.2	1.2	36.9	41.5
Total	**2,131**	**39.9**	**0.2**	**39.5**	**40.3**

Oxford score at 10 Years by shoulder operation

Operation types	No. of operations	Mean	Std. Error	95% confidence interval	
Total	335	41.0	0.5	40.0	42.0
Reverse	104	39.4	0.9	37.7	41.1
Hemi	217	36.4	0.6	35.2	37.6
Partial resurfacing head	17	35.4	2.2	31.1	39.6
Total	674	39.1	0.4	38.4	39.8
Total	**2,131**	**39.9**	**0.2**	**39.5**	**40.3**

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The **nineteen-year** report analyses data for the period January 2000 – December 2018. There were 587 primary elbow procedures registered with an additional 27 registered in 2018.

Data Analysis

Age and sex distribution

The average age for an elbow replacement was 67 years, with a range of 15 – 92 years.

	Female	Male
Number	450	137
Percentage	76.66	23.34
Mean age	67.86	65.42
Maximum age	92.41	91.73
Minimum age	36.38	15.16
Standard dev.	11.50	14.56

Previous operation

None	487
Internal fixation for juxta articular fracture	30
Synovectomy+-removal radial head	22
Debridement	15
Osteotomy	3
Ligament reconstruction	3
Interposition arthroplasty	2

Diagnosis

Rheumatoid arthritis	290
Post fracture	179
Osteoarthritis	90
Other inflammatory	13
Post dislocation	10
Post ligament disruption	6

Approach

Posterior	370
Medial	106
Lateral	39

Bone graft

Humeral autograft	37
Humeral allograft	3
Humeral synthetic	1
Ulnar autograft	3

Cement

Humerus cemented	532
Antibiotic in cement	412 (77%)
Ulna cemented	503
Antibiotic in cement	386 (77%)
Radius cemented	27
Antibiotic in cement	26 (96%)

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	587 (94%)

Operating theatre

Conventional	389
Laminar flow	193
Space suits	81

ASA Class

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

For the fourteen- year period 2005 – 2018, there were 433 (95%) 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	21
2	191
3	213
4	8

Operative time (skin to skin)

Mean	146 minutes

Surgeon grade

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

The following figures are for the fourteen- year period 2005 – 2018.

Consultant	450
Advanced trainee supervised	8
Advanced trainee unsupervised	4

Surgeon and hospital workload

In 2018, 15 surgeons performed 27 primary elbow procedures. These ranged from 1 to 4 per surgeon, with 8 performing 1 elbow procedure.

Hospitals

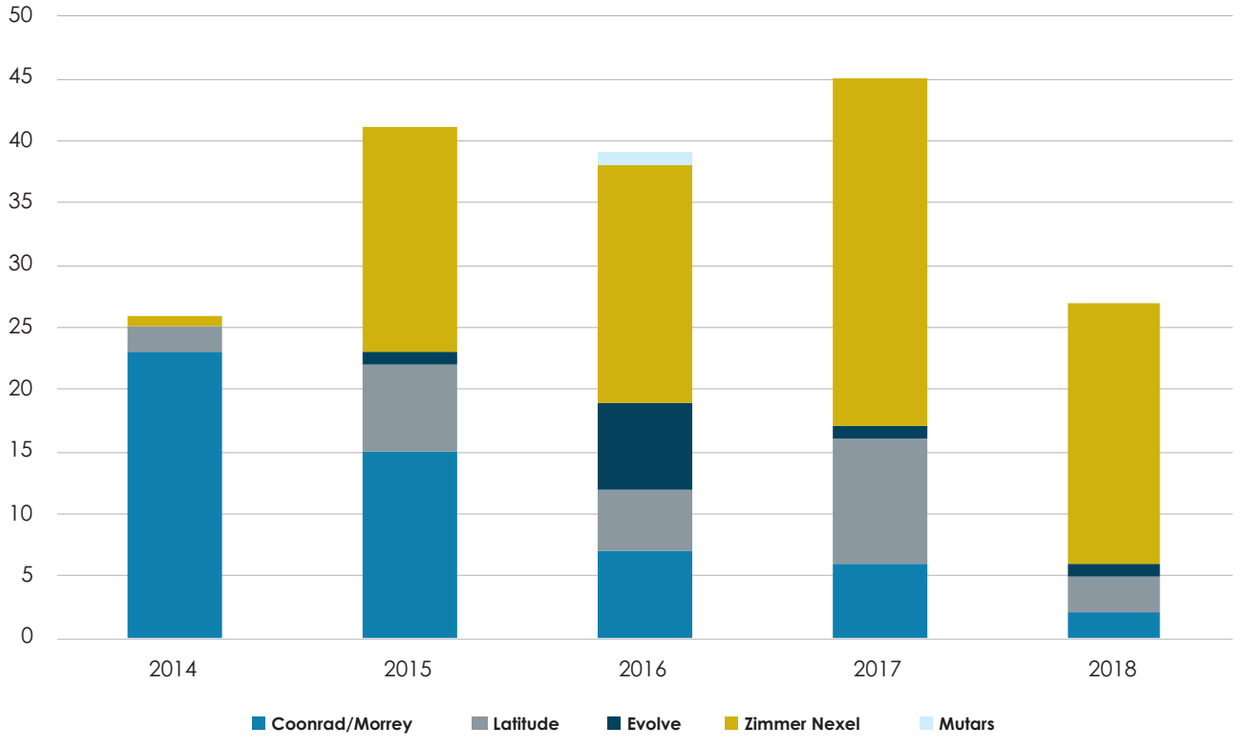
In 2018, primary elbow replacement was performed in 13 hospitals, of which 11 were public and 2 were private.

Prosthesis usage

Elbow prostheses used in 2018

Zimmer Nexel	21
Latitude	3
Coonrad/Morrey	2
Evolve	1

MOST USED ELBOW PROSTHESES FOR FIVE YEARS 2014 – 2018



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 nineteen-year period January 2000 – December 2018, there were 102 revision elbow procedures registered.

The average age for a revision elbow replacement was 66 years, with a range of 30 – 91 years.

	Female	Male
Number	72	30
Percentage	70.59	29.41
Mean	66.47	64.53
Maximum age	89.08	90.50
Minimum age	42.23	30.34
Standard dev.	9.91	14.98

REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTIES

This section analyses data for revisions of primary elbow procedures for the nineteen- year period January 2000 – December 2018.

There were 42 revisions of the primary group of 587 (7.2%).

There were 6 that had been revised twice and 1 that had been revised 3 times.

Time to revision

Average	1,614 days
Maximum	5,174 days
Minimum	62 days
Standard deviation	1,377 days

Reason for revision

Loosening humeral component	5
Deep infection	13
Loosening ulnar component	12
Pain	5
Fracture humerus	4
Loosening radial head component	4
Dislocation	2
Fracture ulna	2

Analysis of the three main reasons for revision by year after primary procedure

	Loosening humeral component		Loosening Ulnar component		Deep infection	
Years	Count	%	Count	%	Count	%
0	1	6.7	1	7.7	2	16.7
1	2	13.3	0	0.0	4	33.3
2	3	20.0	4	30.8	3	25.0
3	3	20.0	2	15.4	0	0.0
4	1	6.7	0	0.0	0	0.0
5	0	0.0	0	0.0	0	0.0
6	0	0.0	0	0.0	1	8.3
7	1	6.7	1	7.7	0	0.0
8	1	6.7	1	7.7	1	8.3
9	1	6.7	1	7.7	0	0.0
10	1	6.7	2	15.4	0	0.0
11	1	6.7	1	7.7	0	0.0
12	0	0.0	0	0.0	0	0.0
13	0	0.0	0	0.0	0	0.0
14	0	0.0	0	0.0	1	8.3
Total	**15**		**13**		**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 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 Elbow Replacements

No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
587	3,819.1	42	1.10	0.79	1.49

Revision Rate of Individual Prostheses Sorted in Alphabetic Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Acclaim	16	154.1	6	3.89	1.43	8.47
Coonrad/Morrey	347	2,651.2	17	0.64	0.36	1.00
Evolve Stem	20	102.3	2	1.96	0.00	7.07
Kudo	18	166.7	4	2.40	0.65	6.14
Latitude	96	577.8	11	1.90	0.95	3.41
Mutars	1	2.9	0	0.00	0.00	129.31
Sorbie Questor	1	6.8	0	0.00	0.00	54.09
Stanmore custom implant	1	8.4	0	0.00	0.00	43.75
Zimmer Nexel	87	148.87	2	1.34	0.16	4.85

Revision vs Gender

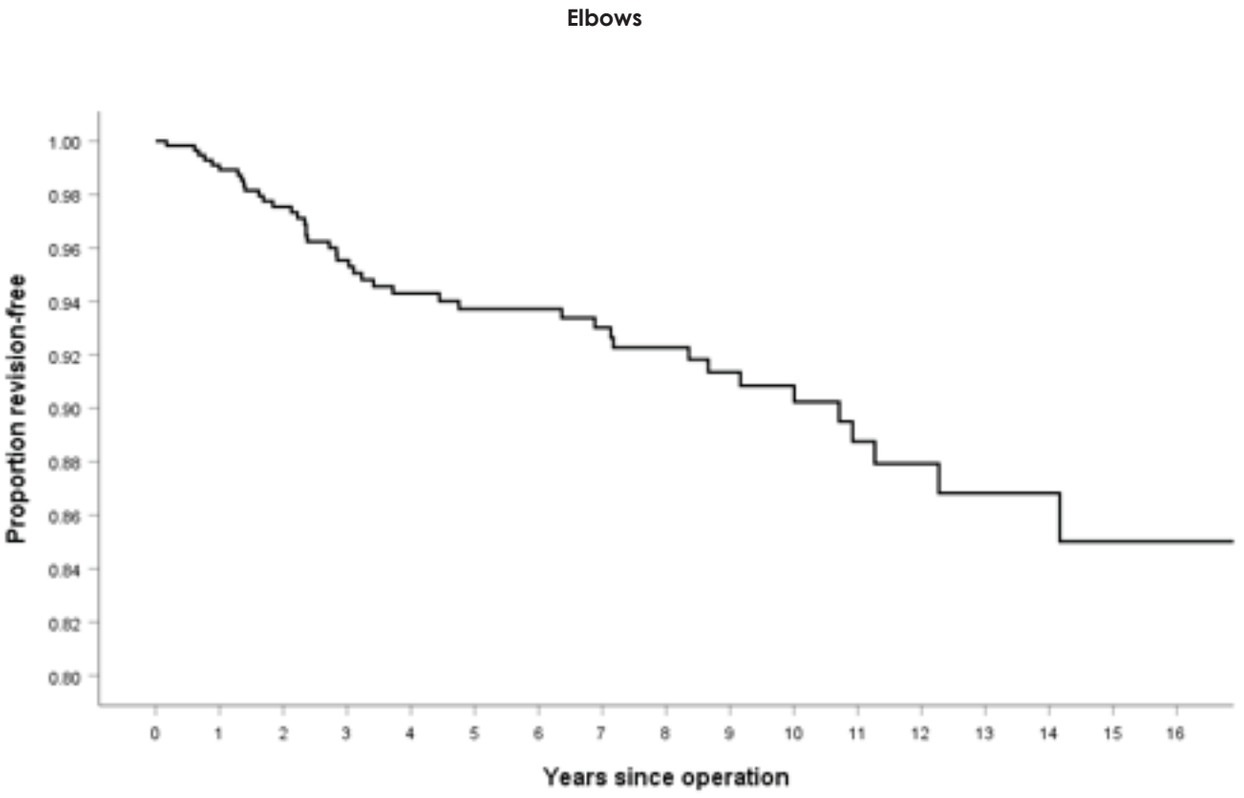
Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	450	3081.0	27	0.88	0.58	1.28
Males	137	738.1	15	2.03	1.14	3.35

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	99	807.6	13	1.61	0.81	2.67
55-64	140	1,085.5	11	1.01	0.47	1.75
65-74	175	1,038.5	12	1.16	0.60	2.02
>=75	173	887.4	6	0.68	0.21	1.39

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 19 years from 2000 to 2018, with deceased patients censored at time of death.



Years	% Revision-free	Number
1	98.9	534
2	97.5	467
3	95.5	402
4	94.3	346
5	93.7	311
6	93.7	288
7	93.0	255
8	92.3	211
9	91.3	184
10	90.8	150
11	88.8	116
12	87.9	86
13	86.8	69

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 was replaced by the validated Oxford Elbow score at the end of 2015.

There are 12 questions and each response is scores from 4-0 with 0 representing the greatest severity.

Total score range 0-48

For the 3 year period 2016 – 2018 there were n = 54 responses.

For the 2 year period 2016 – 2017 there were n = 41 responses.

Average	32.26
Maximum	48
Minimum	8

LUMBAR DISC REPLACEMENT

PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the **seventeen-year** period January 2002 – December 2018.There were 163 lumbar disc replacements registered, an additional 3 compared to last year.

Data Analysis

The average age for a lumbar disc replacement was 40 years, with a range of 22 – 62 years.

	Female	Male
Number	74	89
Percentage	45.40	54.60
Mean age	40.57	39.75
Maximum age	62.19	60.71
Minimum age	24.07	22.25
Standard dev.	8.66	7.67

Disc replacement levels

L3/4	21
L4/5	111
L5/S1	33

Fusion levels

L3/4	5
L4/5	21
L5/S1	37

Previous operation

Discectomy	29
L3/4	0
L4/5	11
L5/S1	17

Diagnosis

Degenerative disc disease

L3/4	12
L4/5	61
L5/S1	85

Annular tear MRI scan

L3/4	13
L4/5	70
L5/S1	26

Discogenic pain on discography

L3/4	20
L4/5	86
L5/S1	63

Approach

Retroperitoneal midline	145
Retroperitoneal lateral	3
Transperitoneal	2

Intraoperative complications

Damage to major veins	13
Subsidence	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	135

Operating theatre

Conventional	90
Laminar flow	72
Spacesuits	2

Operative time (skin to skin)

Mean	139 minutes

Surgeon grade

Consultant	163

REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

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

There were 3 revisions of the primary group of 163 lumbar disc replacements and 1 re-revision.

Time to revision

Mean	1,841 days
Maximum	4,528 days
Minimum	242 days

Reason for revision

Pain	2
Loss of spinal alignment	1

Oswestry Disability Index

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

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

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

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

Pre operative scores

Oswestry Disability Index	n =21
Average	25

CERVICAL DISC REPLACEMENT

This report analyses data for the **fifteen-year** period January 2004 – December 2018. There were 453 primary cervical disc replacements, an additional 60 from the previous year.

Data Analysis

The average age for a cervical disc replacement was 45 years, with a range of 23 – 66 years.

	Female	Male
Number	189	264
Percentage	41.72	58.28
Mean age	46.37	44.59
Maximum age	65.79	68.29
Minimum age	23.26	23.54
Standard dev.	8.08	8.86

Disc replacement levels

C3/4	12
C4/5	46
C5/6	243
C6/7	215
C7T1	8

Previous operation

Foraminotomy	16
Adjacent level fusion	22
Adjacent level disc arthroplasty	2

Diagnosis

Acute disc prolapse	308
Chronic spondylosis	43
Neck pain	27

Approach

Anterior right	269
Anterior left	83

Intra operative complications

Equipment failure	1
Removal of implant	1
Tear jugular vein	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	393

Operating theatre

Conventional	230
Laminar flow	217
Spacesuits	1

Operative time (skin to skin)

Mean	112 minutes

Surgeon grade

Consultant	451
Advanced trainee supervised	2

Revision Cervical disc replacement

There were 3 revisions 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.

Post-operative score

Neck Disability Index	182
Mean	19.89

RE-OPERATION WITHOUT REPLACEMENT OR REMOVAL OF ANY PROSTHETIC COMPONENTS

The re-operation form was introduced in December 2015.

For the period 2015 – 2018 there were 280 re-operations registered, 70 more than last year.

Reason for Re-operation

Deep infection	88
Dislocation of joint	31
Dislocation of bearing	6
Fracture	43
Instability	5
Malalignment	0
Impingement	9
Stiffness	53
Haematoma evacuation	18
Arthrofibrosis	3

Procedure

Open lavage	105
Arthroscopic lavage	6
Closed reduction of dislocation	20
Open reduction of dislocation	9
Fracture fixation	35
Soft tissue procedure	19
Ligament reconstruction	4
Osteotomy	2
Bone debridement	14
Arthrolysis	3
MUA	52

ASA	Number
1	21
2	127
3	100
4	17

Surgeon grade

Consultant	214
Advanced trainee supervised	18
Advanced trainee unsupervised	41
Basic trainee	5

APPENDIX 1 - OXFORD 12 QUESTIONNAIRE REFERENCES

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

APPENDIX 2

Publications in Peer Reviewed Journals

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

Data Forms

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Hip

Free Phone 0800-274-989 **Total Hip Arthroplasty ❑** **Resurfacing Arthroplasty ❑**
31.05.2010

Date: .....

Patient Name:
Address:

d.o.b. **NHI:**
Attach Patient Label

Consultant: .....

[If different from patient label]

BMI:.....

Side:..... **

.pital: .....
Town/City

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

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

FEMUR

Please do not fold bar-coded label

ACETABULUM

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR
❑ **Allograft**
❑ **Autograft** ❑ **Synthetic**

BONE GRAFT - ACETABULUM
❑ **Allograft**
❑ **Autograft** ❑ **Synthetic**

FEMORAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Name: .....ASA Class: 1 2 3 4 (please circle one)

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

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

PRIMARY OPERATING SURGEON
❑ **Consultant** ❑ **Adv Trainee Supervised** **Year.....** ❑ **Adv Trainee Unsupervised** ❑ **Basic Trainee**

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

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

NEW ZEALAND JOINT REGISTRY
Revision Hip Joint

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Consultant: .....
m patient label]
Hospital: .....
Town/City: .....

REASON FOR REVISION

- ❑ Loosening acetabular component
- ❑ Loosening femoral component
- ❑ Dislocation
- ❑ Pain
- ❑ Previous hemiarthroplasty
- ❑ Deep infection
- ❑ Fracture femur
- ❑ Removal of components
- ❑ Other: Name: .....

Date Index Operation: .....

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

REVISION

- ❑ Change of femoral component
- ❑ Change of acetabular component
- ❑ Change of head
- ❑ Change of liner
- ❑ Change of all components

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

❑ Anterior ❑ Posterior ❑ Lateral ❑ Trochanteric osteotomy

FEMUR

Please do not fold bar-coded label

ACETABULUM

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

❑Allograft ❑ Synthetic
❑Autograft

BONE GRAFT - ACETABULUM

❑Allograft ❑ Synthetic
❑Autograft

FEMORAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY

Primary Replacement Knee

Free Phone 0800-274-989 ❑ **Total Knee Arthroplasty** ❑ **Unicompartmental** ❑ **Patellofemoral**
31.05.2010

Date: .....
BMI:.....
Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

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

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fracture
- ❑ Ligament reconstruction
- ❑ Menisectomy
- ❑ Synovectomy
- ❑ Osteotomy
- ❑ Other: Name: .....

DIAGNOSIS

- ❑ Osteoarthritis
- ❑ Rheumatoid arthritis
- ❑ Other inflammatory
- ❑ Tumour
- ❑ Post fracture
- ❑ Post ligament disrupt/reconstruction
- ❑ Avascular necrosis
- ❑ Other: Name:

.....

APPROACH ❑ **Image guided surgery** ❑ **Minimally invasive surgery**
❑ **Medial parapatellar** ❑ **Lateral parapatellar** ❑ **Other**

FEMUR

Please do not fold bar-coded label

TIBIA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

BONE GRAFT - TIBIA

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

PATELLA

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ **Femur** ❑ **Tibia** ❑ **Patella** ❑ **Antibiotic brand: .....**

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**
Name ..... **ASA Class: 1 2 3 4 (please circle one)**

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

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

PRIMARY OPERATING SURGEON
❑ **Adv Trainee Unsupervised**
❑ **Consultant** ❑ **Adv Trainee Supervised** **Year.....** ❑ **Basic Trainee**

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

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

NEW ZEALAND JOINT REGISTRY
Revision Knee Joint

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. **NHI:**

Attach Patient Label

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

Hospital: .....

Town/City:.....

REASON FOR REVISION

- ❑ Loosening femoral component
- ❑ Loosening tibial component
- ❑ Loosening patellar component
- ❑ Pain
- ❑ Previous Unicompartmental
- ❑ Deep infection
- ❑ Fracture femur
- ❑ Fracture tibia
- ❑ Other details: .....

Date Index Operation: .....

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

REVISION

- ❑ Change of femoral component
- ❑ Change of tibial component
- ❑ Change of patellar component
- ❑ Addition of patellar component
- ❑ Change of tibial polyethylene only
- ❑ Change of all components
- ❑ Removal of components
- ❑ Other

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

❑ Medial parapatellar ❑ Lateral parapatellar ❑ Other

FEMUR

Please do not fold bar-coded label

TIBIA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT – FEMUR

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT – TIBIA

❑ Allograft
❑ Autograft ❑ Synthetic

PATELLA

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Femur ❑ Tibia ❑ Patella ❑ Antibiotic brand: .....

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Shoulder

❑ Total shoulder Arthroplasty ❑ Hemiarthroplasty ❑ Reverse Shoulder

24.03.2016

Date:..... **Consultant:** ..... [If different from patient label]

BMI:.....

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Hospital:.....

Side:..... **

Town/City:

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fracture
- ❑ Previous stabilisation
- ❑ Rotator Cuff Repair
- ❑ Osteotomy
- ❑ Arthrodesis
- ❑ Arthroscopic debridement/compression
- ❑ Other: Name: .....

DIAGNOSIS

- ❑ Rheumatoid arthritis
- ❑ Osteoarthritis
- ❑ Other inflammatory
- ❑ Acute fracture proximal humerus
- ❑ Post recurrent dislocation
- ❑ Avascular necrosis
- ❑ Cuff tear arthropathy
- ❑ Post old trauma
- ❑ Other: Name:

.....

APPROACH

❑ Deltopectoral ❑ Other : specify

HUMERUS

Please do not fold bar-coded label

GLENOID

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - GLENOID

❑ Allograft
❑ Autograft ❑ Synthetic

HUMERAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK ALL LABELS ON REVERSE SIDE

CEMENT

❑ Humerus ❑ Glenoid ❑ Antibiotic brand: .....

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Shoulder

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

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

Town/City:.....

REASON FOR REVISION

- ❑ Loosening glenoid component
- ❑ Loosening humeral component
- ❑ Loosening both components
- ❑ Dislocation/instability anterior
- ❑ Instability posterior
- ❑ Subacromial tuberosity impingement
- ❑ Subacromial cuff impingement/tear
- ❑ Fracture humerus
- ❑ Deep infection
- ❑ Pain
- ❑ Other: Name: .....

Date Index Operation: .....

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

REVISION

- ❑ Change of head only
- ❑ Change of humeral component
- ❑ Change of glenoid component
- ❑ Change of liner (glenoid non cemented)
- ❑ Change of all components
- ❑ Remove glenoid
- ❑ Remove humerus
- ❑ Removal of components
- ❑ Other Specify: .....

APPROACH

- ❑ Deltopectoral
- ❑ Other: specify

HUMERUS

Please do not fold bar-coded labels

GLENOID

Please do not fold bar-coded labels

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑Allograft
- ❑ Synthetic
- ❑Autograft

BONE GRAFT - GLENOID

- ❑Allograft
- ❑ Synthetic
- ❑Autograft

HUMERAL HEAD

Please do not fold bar-coded labels

AUGMENTS

Please do not fold bar-coded labels

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

- ❑ Humerus
- ❑ Glenoid
- ❑ Antibiotic brand: .....

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Ankle

Free Phone 0800-274-989
31.05.2010

Date: .....

BMI:.....

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. NHI:

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

Town/City.....

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

- ❑ Osteoarthritis
- ❑ Rheumatoid arthritis
- ❑ Other inflammatory
- ❑ Post trauma
- ❑ Avascular necrosis talus
- ❑ Other: Name:

.....

APPROACH

❑ Anterior ❑ Anterio-lateral ❑ Other

TIBIA

Please do not fold bar-coded label

TALUS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT - TALUS

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

AUGMENTS

Please do not fold bar-coded label

FUSION DISTAL TFJ

STICK ALL LABELS ON REVERSE SIDE

CEMENT

❑Tibia ❑ Talus ❑ Antibiotic Brand:

.....

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Ankle Joint

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

Date: .....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

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

Tick Appropriate Boxes

REASON FOR REVISION

- ❑ Loosening talar component
- ❑ Loosening tibial component
- ❑ Dislocation
- ❑ Pain
- ❑ Deep infection
- ❑ Fracture talus
- ❑ Fracture tibia
- ❑ Dislocations
- ❑ Other details: .....

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

REVISION

- ❑ Change of talar component
- ❑ Change of tibial component
- ❑ Change of polyethylene only
- ❑ Change of all components
- ❑ Removal of components
- ❑ Other Name: .....

APPROACH

❑ Anterior ❑ Anterio-lateral ❑ Posterior

TIBIA

Please do not fold bar-coded label

TALUS

Please do not fold bar-coded label

STICK ALL LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - TALUS

❑ Allograft
❑ Autograft ❑ Synthetic

AUGUMENTS

Please do not fold bar-coded label

FUSION DISTAL TFJ

Yes ❑ No ❑

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Talus ❑ Tibia ❑ Antibiotic brand: .....

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Elbow

Free Phone 0800-274-989
07.04.2005

Date: .....

Patient Name:
Address:

d.o.b. NHI:

Side:..... **

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

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fracture
- ❑ Ligament reconstruction
- ❑ Interposition arthroplasty
- ❑ Debridement
- ❑ Synovectomy ± removal radial head
- ❑ Osteotomy
- ❑ Other: Name: .....

DIAGNOSIS

- ❑ Rheumatoid arthritis
- ❑ Osteoarthritis
- ❑ Other inflammatory
- ❑ Post dislocation
- ❑ Post fracture
- ❑ Post ligament disruption
- ❑ Other: Name: .....

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold bar-coded label

ULNA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

BONE GRAFT - ULNA

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

RADIAL HEAD

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

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Elbow Joint

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

Date: .....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

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

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HU

Please do not fold bar-coded label

UL

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - ULNA

❑ Allograft
❑ Autograft ❑ Synthetic

RADIAL HEAD

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**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Cervical Disc Replacement

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

Date: .....

Patient Name:
Address:

DOB: NHI:

Attach Patient Label

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

Town/City:.....

Tick Appropriate Boxes

ACC ☐ **ACC Claim**

No: .....

LEVELS OF DISC REPLACEMENT

.....

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

PRE OP PATIENT SCORE (NECK DISABILITY INDEX)

PREVIOUS OPERATION

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

DIAGNOSIS

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

APPROACH

❑ Anterior Right ❑ Anterior Left ❑ Other

.....

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

.....

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

❑ Yes ❑ No

OPERATIVE THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

❑ Consultant ❑ Adv Trainee Supervised ❑ Adv Trainee Unsupervised

Year ..... ❑ Basic Trainee

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

NEW ZEALAND JOINT REGISTRY
Revision Cervical Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:
Address:

DOB: NHI:

Attach Patient Label

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

Town/City: .....

LEVEL OF REVISION
.....

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

Tick Appropriate Boxes

ACC ☐ **ACC Claim No:** .....

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

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

REVISION
- ❑ Replace disc prosthesis (same)
- ❑ Replace disc prosthesis (different)
- ❑ Fuse
- ❑ Removal only
- ❑ Other: .....

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

Osteotomy

IMPLANTS

Please do not fold bar-coded label	Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

Please do not fold bar-coded label	Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

SYSTEMIC ANTIBIOTIC PROPHYLAXIS
Name .....

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Primary Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:
Address:

d.o.b. NHI:
Attach Patient Label

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

Town/City.....

Tick Appropriate Boxes **ACC** ☐ **ACC Claim No.** .....

DISC REPLACEMENT Levels
❑ L3/4
❑ L4/5
❑ L5/S1

FUSION Levels
❑ L3/4
❑ L4/5
❑ L5/S1
Percentage score

PRE OP PATIENT SCORE
Modified Roland and Morris
Total number of "Yes" responses.....
Oswestry Score
Other .....

PREVIOUS OPERATION
❑ Discectomy ❑ L3/4 ❑ L4/5 ❑ L5/S1 ❑ Other .....
❑ Other ..... ❑ L3/4 ❑ L4/5 ❑ L5/S1

DIAGNOSIS
1. Degenerative Disc disease (plain x-ray changes present) ❑ L3/4 ❑ L4/5 ❑ L5/S1 ❑ Other .....
2. Annular tear MRI scan (normal plain x-ray) ❑ L3/4 ❑ L4/5 ❑ L5/S1 ❑ Other .....
3. Discogenic pain on discography ❑ L3/4 ❑ L4/5 ❑ L5/S1 ❑ Other .....

APPROACH
❑ Retroperitoneal midline abdominal wall incision ❑ Transperitoneal
❑ Retroperitoneal lateral abdominal wall incision ❑ Other .....

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS
.....

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS
Yes ❑ **No** ❑

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

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Revision Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

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

Tick Appropriate Boxes **ACC** ☐ **ACC Claim No:** .....

REASON FOR REVISION

- ❑ Loosening of components
- ❑ Dislocation of articulating core
- ❑ Loss of spinal alignment
- ❑ Pain
- ❑ Deep infection
- ❑ Fracture of vertebra
- ❑ Removal of components
- ❑ Other: Name: .....

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

REVISION

- ❑ Change of TDR components
- ❑ Change to Anterior Fusion
- ❑ Change of articulating core
- ❑ In-situ posterior instrumented fusion

APPROACH

- ❑ Retroperitoneal midline abdominal wall incision
- ❑ Retroperitoneal lateral abdominal wall incision
- ❑ Transperitoneal
- ❑ Other .....
- ❑ Posterior Approach for in-situ fusion

NEW DISC REPLACEMENT Levels

- ❑ L3/4
- ❑ L4/5
- ❑ L5/S1

NEW FUSION Levels

- ❑ L3/4
- ❑ L4/5
- ❑ L5/S1

Other .....

PRE OP PATIENT SCORE
Modified Roland and Morris
Total number of "Yes" responses.....
Oswestry Score
Percentage score

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

.....

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS
Yes ❑ **No** ❑

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

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

PRIMARY OPERATING SURGEON
❑ **Consultant** ❑ **Adv Trainee** **Year**..... ❑ **Basic Trainee**

NEW ZEALAND JOINT REGISTRY

REOPERATION WITHOUT REPLACEMENT or REMOVAL OF ANY PROSTHETIC COMPONENTS

Patient label

Patient Name:
Address:

D.O.B. **NHI:**

Attach Patient Label

Date: ..... **Consultant: .....**
(if different from label)

Side: ..... **Hospital: .....**

Town/City: .....

Tick Appropriate Boxes

□ Hip □ Knee □ Ankle □ Shoulder □ Elbow

REASON FOR REOPERATION

□ Deep Infection
□ Dislocation of joint
□ Dislocation of bearing
□ Fracture
□ Instability
□ Malalignment
□ Impingement
□ Stiffness
□ Haematoma evacuation
□ Arthrofibrosis
□ Other

Date Index Operation: .....

PROCEDURE

□ Open lavage
□ Arthroscopic lavage
□ Closed reduction of dislocation
□ Open reduction of dislocation
□ Fracture fixation
□ Soft tissue procedure
□ Ligament reconstruction
□ Osteotomy
□ Bone debridement
□ Arthrolysis
□ M. U. A.
□ Other

□ SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

PRIMARY OPERATING SURGEON

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

TOTAL HIP REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

1 How would you describe the pain you usually had from your operated on hip?
- 4 None
- 3 Very mild
- 2 Mild
- 1 Moderate
- 0 Severe

2 For how long have you been able to walk before the pain from your operated on hip becomes severe? (with or without a stick)
- 4 No pain/more than 30 minutes
- 3 16 to 30 minutes
- 2 5 to 15 minutes
- 1 Around the house only
- 0 Unable to walk because of severe pain

3 Have you had any trouble getting in and out of a car or using public transport because of your operated on hip?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Have you been able to put on a pair of socks, stockings or tights?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

5 Could you do the household shopping on your own?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

8 After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on hip?
- 4 Not at all painful
- 3 Slightly painful
- 2 Moderately painful
- 1 Very painful
- 0 Unbearable

9 Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?
- 4 No days
- 3 Only 1 or 2 days
- 2 Some days
- 1 Most days
- 0 Every day

10 Have you been limping when walking, because of your operated on hip?
- 4 Rarely/never
- 3 Sometimes or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

11 Have you been able to climb a flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

12 Have you been troubled by pain from your operated on hip in bed at night?
- 4 No nights
- 3 Only 1 or 2 nights
- 2 Some nights
- 1 Most nights
- 0 Every night

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION HIP REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed **Left** **Right**

1 How would you describe the pain you usually had from your operated on hip?
- 4 None
- 3 Very mild
- 2 Mild
- 1 Moderate
- 0 Severe

2 For how long have you been able to walk before the pain from your operated on hip becomes severe? (with or without a stick)
- 4 No pain/more than 30 minutes
- 3 16 to 30 minutes
- 2 5 to 15 minutes
- 1 Around the house only
- 0 Unable to walk because of severe pain

3 Have you had any trouble getting in and out of a car or using public transport because of your operated on hip?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Have you been able to put on a pair of socks, stockings or tights?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

5 Could you do the household shopping on your own?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

8 After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on hip?
- 4 Not at all painful
- 3 Slightly painful
- 2 Moderately painful
- 1 Very painful
- 0 Unbearable

9 Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?
- 4 No days
- 3 Only 1 or 2 days
- 2 Some days
- 1 Most days
- 0 Every day

10 Have you been limping when walking, because of your operated on hip?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

11 Have you been able to climb a flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

12 Have you been troubled by pain from your operated on hip in bed at night?
- 4 No nights
- 3 Only 1 or 2 nights
- 2 Some nights
- 1 Most nights
- 0 Every night

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

TOTAL KNEE REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:** .....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

1 How would you describe the pain you usually have from your operated on knee?
- 4 None
- 3 Very mild
- 2 Mild
- 1 Moderate
- 0 Severe

2 For how long have you been able to walk before the pain from your operated on knee becomes severe? (with or without a stick)
- 4 No pain/more than 30 minutes
- 3 16 to 30 minutes
- 2 5 to 15 minutes
- 1 Around the house only
- 0 Unable to walk because of severe pain

3 Have you had any trouble getting in and out of a car or using public transport because of your operated on knee?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Could you kneel down and get up again afterwards on your operated knee?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

5 Could you do the household shopping on your own?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

6 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

7 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

8 After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on knee?
- 4 Not at all painful
- 3 Slightly painful
- 2 Moderately painful
- 1 Very painful
- 0 Unbearable

9 Have you felt that your operated on knee might suddenly "give way" or let you down?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

10 Have you been limping when walking, because of your operated on knee?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

11 Could you walk down one flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

12 Have you been troubled by pain from your operated on knee in bed at night?
- 4 No nights
- 3 Only 1 or 2 nights
- 2 Some nights
- 1 Most nights
- 0 Every night

.....

☐ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION KNEE REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS**

Please circle the SIDE on which you had your surgery performed Left Right

1 How would you describe the pain you usually have from your operated on knee?
- 4 None
- 3 Very mild
- 2 Mild
- 1 Moderate
- 0 Severe

2 For how long have you been able to walk before the pain from your operated on knee becomes severe? (with or without a stick)
- 4 No pain/more than 30 minutes
- 3 16 to 30 minutes
- 2 5 to 15 minutes
- 1 Around the house only
- 0 Unable to walk because of severe pain

3 Have you had any trouble getting in and out of a car or using public transport because of your operated on knee?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Could you kneel down and get up again afterwards?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

5 Could you do the household shopping on your own?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

6 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

7 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

8 After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your operated on knee?
- 4 Not at all painful
- 3 Slightly painful
- 2 Moderately painful
- 1 Very painful
- 0 Unbearable

9 Have you felt that your operated on knee might suddenly "give way" or let you down?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

10 Have you been limping when walking, because of your operated on knee?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

11 Could you walk down one flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

12 Have you been troubled by pain from your operated on knee in bed at night?
- 4 No nights
- 3 Only 1 or 2 nights
- 2 Some nights
- 1 Most nights
- 0 Every night

Additional Information

□ 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.

Manchester-Oxford Foot Questionnaire (MOxFQ)

Circle as appropriate Right / Left **Full Name**_____

Please tick (√) one for each statement

1. I have pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

2. During the past 4 weeks this has applied to me:
I avoid walking long distances because of pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

3. During the past 4 weeks this has applied to me:
I change the way I walk due to pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

4. During the past 4 weeks this has applied to me:
I walk slowly because of pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

5. During the past 4 weeks this has applied to me:
I have to stop and rest my foot/ankle because of pain

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

6. During the past 4 weeks this has applied to me:
I avoid some hard or rough surfaces because of pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

7. During the past 4 weeks this has applied to me:
I avoid standing for a long time because of pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

8. During the past 4 weeks this has applied to me:
I catch the bus or use the car instead of walking, because of pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

9. During the past 4 weeks this has applied to me:
I feel self-conscious about my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

10. During the past 4 weeks this has applied to me:
I feel self-conscious about the shoes I have to wear

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

11. During the past 4 weeks this has applied to me:
The pain in my foot/ankle is more painful in the evening

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

12. During the past 4 weeks this has applied to me:
I get shooting pains in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

13. During the past 4 weeks this has applied to me:
The pain in my foot/ankle prevents me from carrying out my work/everyday activities

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

14. During the past 4 weeks this has applied to me:
I am unable to do all my social or recreational activities because of pain in my foot/ankle

None of the Time	Rarely	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

15. During the past 4 weeks…..
How would you describe the pain you usually have in your foot/ankle?

None	Very mild	Mild	Moderate	Severe
☐	☐	☐	☐	☐

16. During the past 4 weeks….
Have you been troubled by pain from your foot/ankle in bed at night?

No nights	Only 1 or 2 nights	Some nights	Most nights	Every night
☐	☐	☐	☐	☐

TOTAL SHOULDER REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating Surgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please **circle the number** which best describes yourself **OVER THE LAST 4 WEEKS** **Which is your dominant arm?** **Left** **Right**

Please circle the SIDE on which you had your surgery performed **Left** **Right**

1 How would you describe the ***worst*** pain you have had from your operated on shoulder?
- 4 None
- 3 Mild
- 2 Moderate
- 1 Severe
- 0 Unbearable

2 How would you describe the pain you ***usually*** have from your operated on shoulder?
- 4 None
- 3 Very mild
- 2 Mild
- 1 Moderate
- 0 Severe

3 Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Have you been able to use a knife and fork at the same time?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

5 Could you do the household shopping on your own?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

6 Could you carry a tray containing a plate of food across a room?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

8 Have you had any trouble dressing yourself because of your operated on shoulder?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

9 Could you hang your clothes up in a wardrobe – using the operated on arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

10 Have you been able to wash and dry yourself under both arms?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

11 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

12 Have you been troubled by pain from your operated on shoulder in bed at night?
- 4 No nights
- 3 Only 1 or 2 nights
- 2 Some nights
- 1 Most nights
- 0 Every night

.....

□ I wish to receive a progress report on the study. **NB:** If there are reasons other than the operation which would stop you doing one of the tasks listed; try to answer the question from the joint replacement aspect alone.

REVISION SHOULDER REPLACEMENT - QUESTIONNAIRE

Patient Name: ..... **Date of Birth:** .....
Patient Address: ..... **Operating urgeon:**.....
..... **Date of Surgery:**.....

We would like you to score yourself on the following 12 questions. Each question is scored from 4 to 0, from least to most difficulty or severity: 4 being the least difficult/severe and 0 being the most difficult/severe. Please circle the number which best describes yourself **OVER THE LAST 4 WEEKS** **Which is your dominant arm?** **Left** **Right**

Please circle the SIDE on which you had your surgery performed **Left** **Right**

1 How would you describe the ***worst*** pain you have had from your operated on shoulder?
- 4 None
- 3 Mild
- 2 Moderate
- 1 Severe
- 0 Unbearable

2 How would you describe the pain you ***usually*** have from your operated on shoulder?
- 4 None
- 3 Very mild
- 2 Mild
- 1 Moderate
- 0 Severe

3 Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Have you been able to use a knife and fork at the same time?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

5 Could you do the household shopping on your own?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

6 Could you carry a tray containing a plate of food across a room?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

8 Have you had any trouble dressing yourself because of your operated on shoulder?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

9 Could you hang your clothes up in a wardrobe – using the operated on arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

10 Have you been able to wash and dry yourself under both arms?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

11 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

12 Have you been troubled by pain from your operated on shoulder in bed at night?
- 4 No nights
- 3 Only 1 or 2 nights
- 2 Some nights
- 1 Most nights
- 0 Every night

.....

□ 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.

Oxford Elbow Score (OES)

Problems with your elbow **Full Name**_____

Circle as appropriate **Right / Left** **Please tick (√) one box for every question**

1. **During the past 4 weeks**:
   Have you had difficulty lifting things in your home, such as putting out the rubbish, because of your elbow problem?

No difficulty	A little bit of difficulty	Moderate difficulty	Extreme difficulty	Impossible to do
☐	☐	☐	☐	☐

2. During the past 4 weeks:
   Have you had difficulty carrying bags of shopping, because of your elbow problem?

No difficulty	A little bit of difficulty	Moderate difficulty	Extreme difficulty	Impossible to do
☐	☐	☐	☐	☐

3. During the past 4 weeks:
   Have you had any difficulty washing yourself all over, because of your elbow problem?

No difficulty	A little bit of difficulty	Moderate difficulty	Extreme difficulty	Impossible to do
☐	☐	☐	☐	☐

4. During the past 4 weeks:
   Have you had any difficulty dressing yourself, because of your elbow problem?

No difficulty	A little bit of difficulty	Moderate difficulty	Extreme difficulty	Impossible to do
☐	☐	☐	☐	☐

5. During the past 4 weeks:
   Have you felt that your elbow problem is “controlling your life”?

No, not at all	Occasionally	Some days	Most days	Every day
☐	☐	☐	☐	☐

6. During the past 4 weeks:
   How much has your elbow problem “been on your mind"?

Not at all	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

7. During the past 4 weeks:
   Have you been troubled by pain from your elbow in bed at night?

Not at all	1 or 2 nights	Some nights	Most nights	Every night
☐	☐	☐	☐	☐

8 During the past 4 weeks:

How often has your elbow pain interfered with your sleeping?

Not at all	Occasionally	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

9 During the past 4 weeks:
How much has your elbow problem interfered with your usual work or everyday activities?

Not at all	A little bit	Moderately	Greatly	Totally
☐	☐	☐	☐	☐

10 During the past 4 weeks:

Has your elbow problem limited your ability to take part in leisure activities that you enjoy doing?

No, not at all	Occasionally	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

11 During the past 4 weeks:
How would you describe the worst pain you have from your elbow?

No pain	Mild pain	Moderate pain	Severe pain	Unbearable
☐	☐	☐	☐	☐

12 During the past 4 weeks:
How would you describe the pain you usually have from your elbow?

No pain	Mild pain	Moderate pain	Severe pain	Unbearable
☐	☐	☐	☐	☐

The New Zealand Joint Registry Twenty Year Report (January 1999 - December 2018)

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