THE NEW ZEALAND JOINT REGISTRY

TWENTY-ONE YEAR REPORT
JANUARY 1999 TO DECEMBER 2019

21

YEARS

NZOA
New Zealand
Orthopaedic Association

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Date of Publication: December 2020

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EDITORIAL COMMENT

The Registry Management Committee is pleased to present the twenty one 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 2019 was 326,150, which had been performed on 217,720 individual patients, of which 51,602 (24%) have now died during the twenty one year period.

The number of observed component years (ocys) contained within the Registry is now over two million. The increase of 22,326 registered joints for 2019 remains almost identical to the 22,271 performed in 2018.

The mean BMI's 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 144,786 conventional total hip arthroplasties with an overall revision rate of 0.71 per 100 ocys (95% confidence interval; 0.70 -0.73) with a 19 year prosthesis survival of 84.36% (cemented 84.73%; uncemented 84.08% and hybrid 84.65%).

More females than males received a hip replacement (52.97% vs 47.03%), with a slightly higher mean age (68.48 vs 65.49 years), but a very wide range for both (13 to 101 yrs)

Most had no previous surgery (97.5%) and a diagnosis of osteoarthritis (89.2%). The posterior approach is slightly more popular this year than last (67.7% vs 67.3%), while the percentage of patients operated on through a lateral approach decreased slightly (23.7% vs 25.3%).

From 2014 to 2018, approximately 200 hips per year were performed through the anterior approach (218 in 2018). Its popularity increased in 2019, however with 317 hips performed using the anterior approach, possibly reflecting overseas trends.

Fully cemented hip replacement has fallen from 14% in 2012, but it has stabilised at approximately 7% in the last 3 years.

The ceramic on polyethylene bearing surface continues to increase in popularity rising from 42% of the total in 2017 to 52% in 2019.

This is mainly at the expense of metal on polyethylene, reflecting the growing awareness of trunnion fretting/taperosis as a potential source of hip failure. Increasing confidence in the long-term results of cross-linked polyethylene likely accounts for the slow decrease in the use of ceramic-on-ceramic as a bearing surface since 2011.

The most popular head size overall remains 32mm, although the use of 36mm heads increased in 2019, again reflecting increased confidence with crosslinked polyethylene when used to manufacture thinner liners than in the past.

Interestingly, there has been a resurgence of metal on metal articulations in 2019, with 235 hips being added, compared to approximately 50 for the previous 2 years. The reasons for this are unclear.

The use of cross-linked polyethylene remains the dominant choice again accounting for in excess of 96% of all polyethylene used.

This year has seen the adding of a fifth column to the age banding analysis reported previously, age of patients less than 40 years.

As can be seen in the Revision vs Age Bands Table on p. 63, 2,279 patients in the Registry are aged less than 40 years (1.57%).

The revision rate per 100 component years for this group is significantly higher than the New Zealand mean.

In the next Table, Revision for Age Bands vs Bearing Surface, if we take out the use of ceramic on metal articulation (15 patients), only the ceramic on ceramic bearing surface has a 95% confidence interval which overlaps the New Zealand mean (0.71ocys.)

Fixation in the under 40 age group remains controversial. Cemented arthroplasty, the only fixation method with confidence intervals overlapping the New Zealand mean, has only 72 patients with a total of 760 ocys. Hybrid and uncemented results in this group are similar.

The Table headed Revision versus Hip Prostheses Combinations sorted on Revision Rate on pp 37 – 40, shows the 112 combinations of prostheses used in 2019 where there is data for that combination (minimum 50 primary registered arthroplasties). They are sorted on revision rate, and we hope each surgeon will note the results of their preferred combination.

Two combinations used in 2019, in 32 hips, show high revision rates above those expected based on the overall mean rate. The ABGII/RM Pressfit Cup was highlighted in last year's 2018 report as showing high revision rates. Despite this "flagging", surgeons chose to use 8 in 2019. This prosthesis continues to show unacceptably high revision rates this year and continued use should be questioned.

"The total number of registered joint arthroplasties at 31st of December 2019 was **326,150**, which had been performed on **217,720** individual patients, of which 51,602 (24%) have now died during the twenty one year period. "

The CPT/G7 acetabulum combination appears to have a significantly higher revision rate this year, but its use is less than last year (58 hips in 2018, 24 hips in 2019). It will also need careful future monitoring.

The Accolade II/Continum TM combination appears for the first time in this Table, with 88 out of the 102 hips performed in 2019. Four early revisions with low ocys will require careful future monitoring.

The Corail/Pinnacle combination was again the most popular in 2019, with 1,559 primary arthroplasties, while the Exeter V40/ Trident combination was 1,024 primary arthroplasties. Both have revision rates well below the New Zealand mean, 0.66 and 0.44 ocys respectively.

To illustrate the power of the New Zealand Joint Registry in surgeon decisions, it is worth looking at the results of what most surgeons would consider the cemented stem with the combination of the longest follow up and the lowest revision rate, the Exeter V40 femoral prosthesis in Table Prosthesis combinations based on Femur in Alphabetical Order Pp 55-56. Although paired with 29 different acetabular components, only one, the Duraloc, had an exact 95% confidence interval greater than the New Zealand mean.

Resurfacing hip arthroplasty

The number of resurfacing arthroplasties remains steady at 124 in 2019, similar to the 118 in 2018, but an increase from the low point of their use in 2016.

The revision rate has again fallen from a rate of 1.06 ocys (0.90 – 1.24) in 2018, to 1.01 ocys (0.86- 1.18) in 2019.

Knee Arthroplasty

119,109 conventional total knee arthroplasties have been registered totalling 841,619 ocys with the overall revision rate 0.48/100 ocys, (95% confidence interval; 0.46-0.49) and the excellent 21-year survival of 92.1%.

The number of TKA's implanted per year is stabilising, with 8,431 implanted in 2019, similar to the 8,392 implanted in 2018.

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 2019, 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 0.319/100ocys.

The Nexgen has the biggest number of registrations at 20,066 with 169,860 ocys and a revision rate of 0.52/100ocys.

Three of the currently used cemented protheses, Persona, Trekking and the Journey, one fully uncemented prosthesis (LCS) and one hybrid (Optetrak), had a higher revision rate than the overall rate of 0.48/100ocys at 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 679 registered patello-femoral prostheses, with 77 added in 2019, compared to 71 in 2018.

66 have been revised and the revision rate at 1.84/100 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

There are 13,680 registered primary unicompartmental prostheses with a total of 97,203 ocys, a mean revision rate of 1.17/100 ocys and an 18 year survival of 78%. Pain remains the main listed reason for revision. It is to be hoped that the new data collection forms will continue to improve the diagnostic accuracy of reason for revision surgery.

There were 1,053 registrations in 2019, very similar to the 2018 numbers.

Once again, the Oxford uncemented prosthesis was very dominant, accounting for 62% of the unicompartmental prostheses implanted in 2019.

The revision rate is 0.75/100 ocys for the medial Oxford UKR's and the lateral Oxford UKR's have a revision rate of 1.72/100ocys.

The Zimmer unicompartmental prothesis has a lower rate of 0.53/100ocys.

The overall revision rate is 1.17/100 ocys, however surgeons who perform less than 10 UKR's per year have a significantly higher revision rate – 1.38/100 ocys compared to surgeons doing 10 or more procedures 1.00/100 ocys.

The overall unicompartmental knee revision rate remains significantly higher when compared to total knee replacements by a factor of 2.5 times (TKR 0.48 v. UKR 1.17 ocys).

However, patients having UKR's report consistently superior Oxford scores at 5Y and 10Y post- surgery, with fewer patients having Kalairajah group 1 (<27) (11.5% and 16.3% v. 16% and 18%).

Similarly, more patients have Kalairajah group 4 scores (>42) (65% and 61.2% v. 59.2% and 56.6%) at 5Y and 10Y.

Given that there is a clear relationship between surgeon volume and outcome, and the most commonly used contemporary protheses have better results than the overall Registry data, the continuing low volume implantation of infrequently used implants warrants careful ongoing scrutiny.

Ankle arthroplasty

There are 1,737 primary registered ankle prostheses with a total of 11,326 ocys.

There were 136 primary ankle arthroplasties registered in 2019.

Shoulder arthroplasty

There are 11,428 registered primary shoulder prostheses, with a total of 62,988 ocys. An additional 1,104 primary shoulder replacements have been performed in 2019. Although there has been only a small increase in shoulder arthroplasty in 2019, there remains a steady increase over the last 10 years, with a 6-7% annual growth in the utilisation of shoulder arthroplasty in New Zealand.

Reverse arthroplasty remains the predominant implant in 2019, now representing 77% of all shoulder arthroplasties performed. The use of reverse shoulder replacement is rapidly increasing, with annual growth in excess of 20%. The percentage decline in anatomic shoulder replacement continues, but it is deceptive as the actual number of total shoulder replacements has been relatively stable over the last 10 years. The percentage decline represents the increase in reverse shoulder replacement.

The 10 year survival of all shoulder prostheses is 91.8%, whilst the 15 year revision free survival is 89.2%.

The revision rate of 0.94 per 100 component years for primary shoulder arthroplasty remains steady, as do the rates of total (0.94) and reverse arthroplasty (0.74). The burden of revision surgery in shoulder arthroplasty continues to increase at a rate of 12%.

911 revision cases have been performed, an increase of 94 on the previous year. 5% of all shoulder arthroplasties have undergone revision surgery. Pain remains 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 1 case of each total and partial resurfacing were performed in 2019, so this form of shoulder arthroplasty is no longer routinely used.

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

Average Oxford scores remain unchanged from 2019. 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 seven-fold increase in risk of revision compared to those with a score of 34 or greater.

Elbow arthroplasty

There are 623 registered primary elbow prostheses with a total of 4,178ocys.

There were 37 primary elbow prostheses registered in 2019.

Worldwide, the diagnosis of rheumatoid arthritis has decreased and trauma has increased as an indication for elbow replacement.

Deep Infection

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.

Oxford 12 Questionnaire

Six month, five, ten, fifteen and twenty year 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, five and ten 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 five year scores are not only statistically significant but also clinically significant when compared to the six month scores.

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 include 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 I: 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, 15Y and 20Y.

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 2019 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's Connected Health Network SFPT service with twice monthly updates.

Accurate date of death registrations is essential for both our statistical analyses and our monthly questionnaire mail outs.

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 21 year period to December 2019 was 326,150.

During this period 217,720 individual patients were registered, of which 51,602 (24%) have died.

Bilateral joint replacements carried out under the same anaesthetic;

Bilateral hips

2,735

(5,470 hips)
4% of primary hips

Bilateral knees

4,643

patients (9,286 knees)
8% of primary knees

Bilateral Unicompartmental knees

1,052

patients (2,104 knees) 15% of unicompartmental knees

Bilateral ankles

2

patients (4 ankles)

Bilateral shoulders

5

patients (8 shoulders)

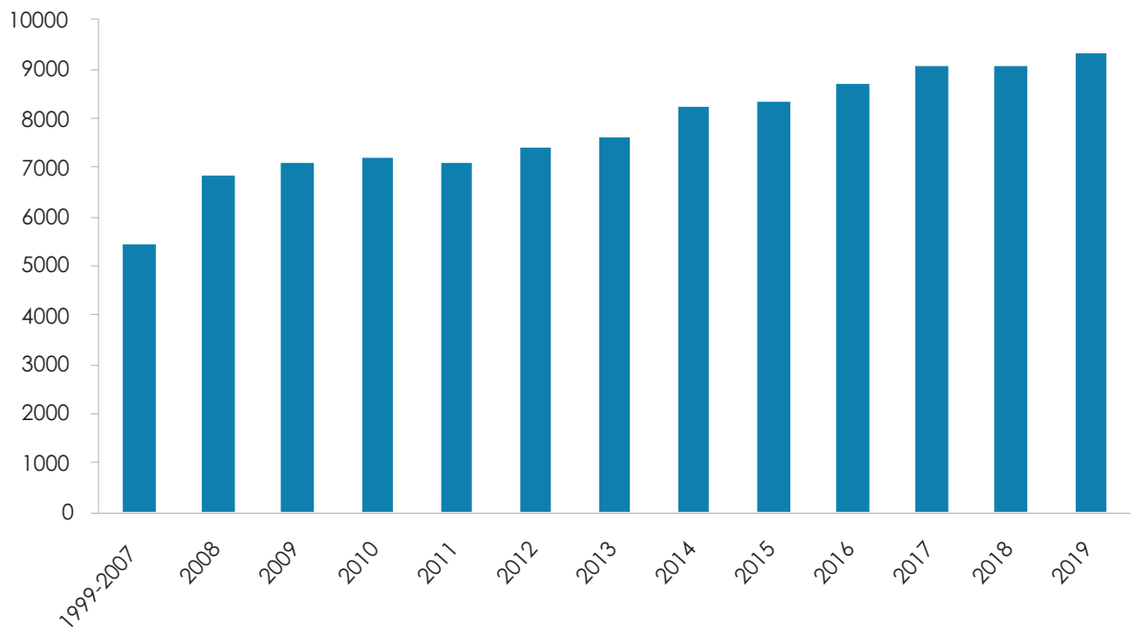
Trainee Surgeons: In the following analyses consultants took responsibility for their registrar surgeon procedures.

HIP ARTHROPLASTY

PRIMARY HIP ARTHROPLASTY

The **twenty-one year** report analyses data for the period January 1999 – December 2019. There were 146,787 primary hip procedures registered including 2,001 resurfacing arthroplasties. This is an additional 9,449 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	77,756	69,031
Percentage	52.97	47.03
Mean age	68.48	65.49
Maximum age	100.95	99.62
Minimum age	13.43	14.64
Standard dev.	11.42	11.48

Conventional hip arthroplasty

	Female	Male
Number	77,495	67,291
Percentage	53.52	46.48
Mean age	68.54	65.83
Maximum age	100.95	99.62
Minimum age	13.43	14.64
Standard dev.	11.38	11.35

Resurfacing hip arthroplasty

	Female	Male
Number	261	1,740
Percentage	13.04	86.96
Mean age	50.04	52.40
Maximum age	65.88	81.44
Minimum age	25.72	17.74
Standard dev.	7.22	8.55

Body Mass Index

For the ten year period 2010 – 2019 there were 56,850 BMI registrations for primary hip replacements. The average was 29 with a range of 14 – 65 and a standard deviation of 5.70.

Previous operation

None	141,117
Internal fixation	2,568
Osteotomy	719
Arthrodesis	94

Diagnosis

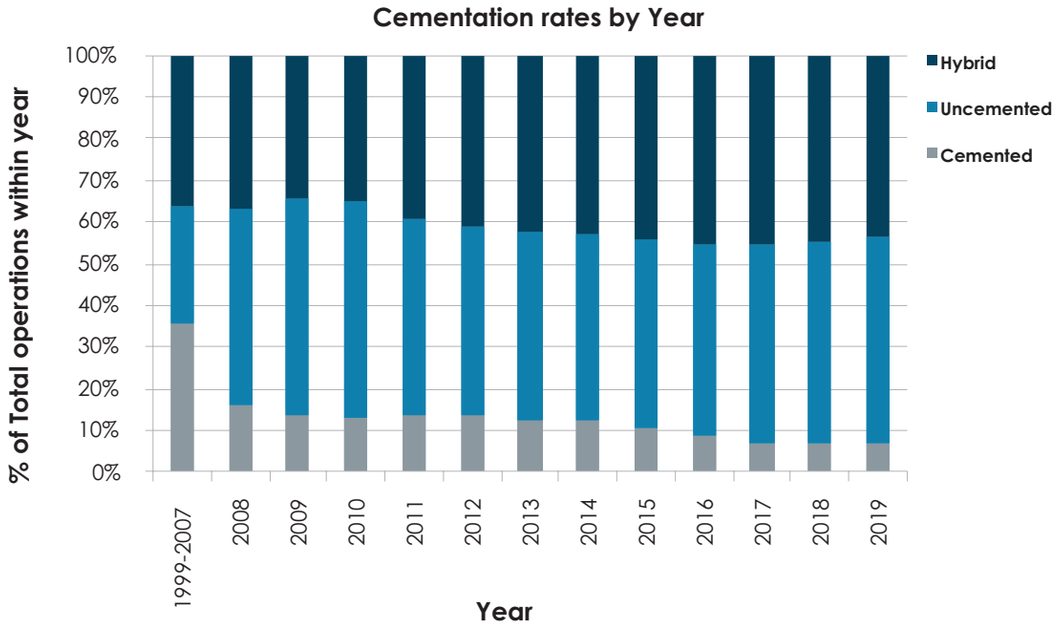
Osteoarthritis	129,153
Acute fracture NOF	5,645
Avascular necrosis	4,340

Developmental dysplasia	3,061
Rheumatoid arthritis	1,736
Old fracture NOF	1,684
Other inflammatory	942
Tumour	671
Post-acute dislocation	364

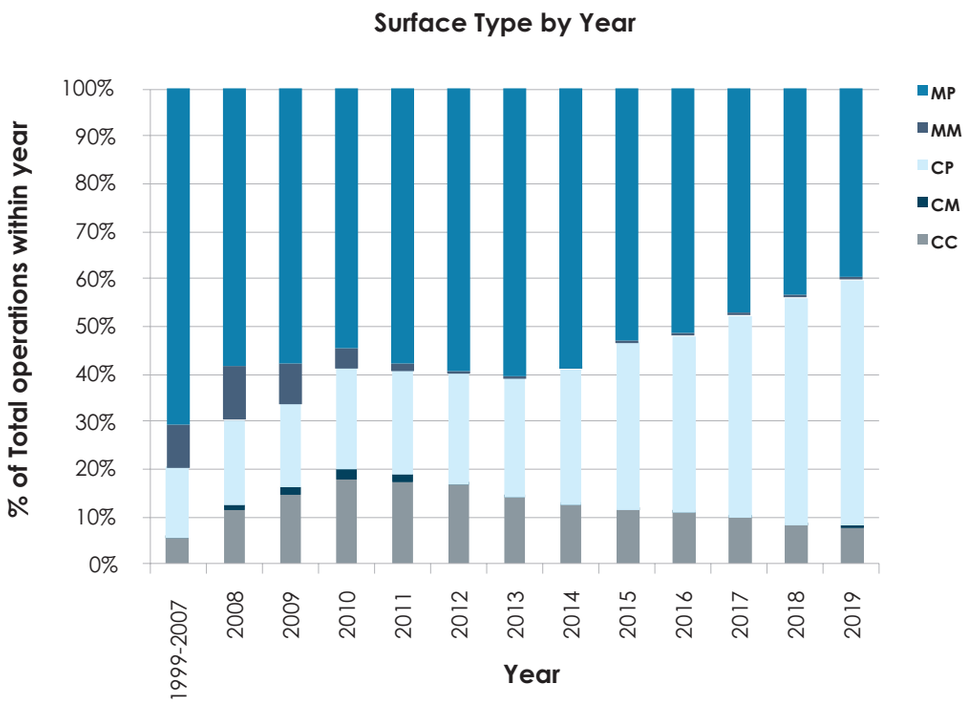
Approach

Posterior	98,056
Lateral	34,310
Anterior	4,940
Minimally invasive	1,944
Image guided surgery	644
Trochanteric osteotomy	228

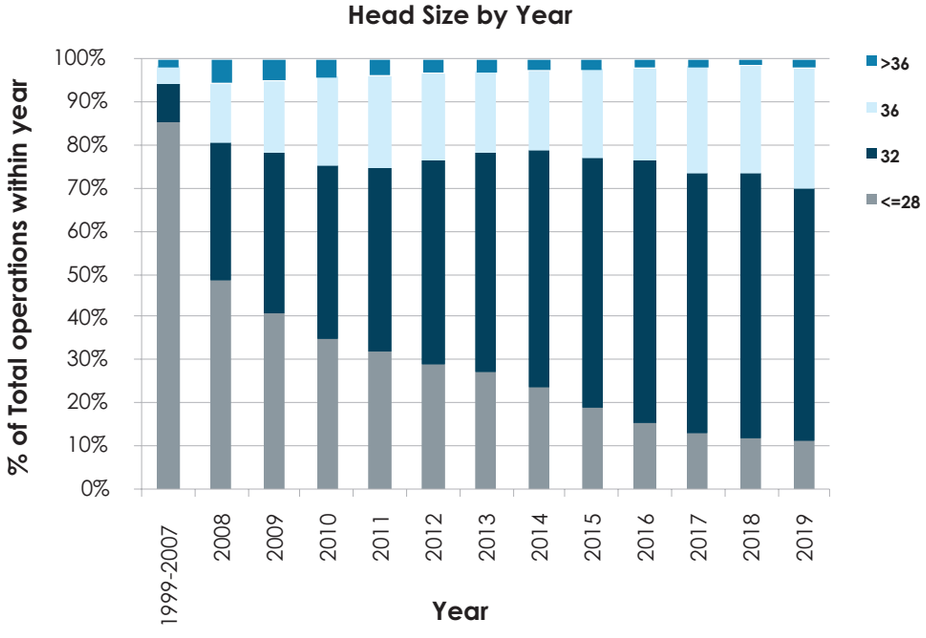
Comparison of proportions of cemented vs uncemented vs hybrid by year



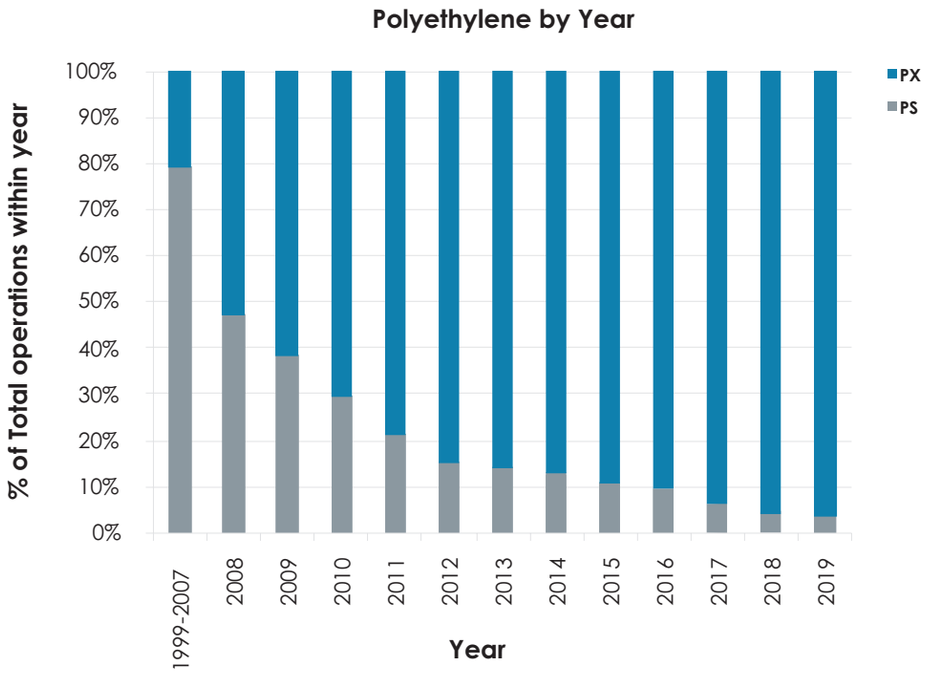
Comparison of different bearing surface usage over time



Comparison of head size usage over time



Comparison usage of standard vs cross linked polyethylene over time



Bone graft

Femoral autograft	245
Femoral allograft	48
Femoral synthetic	9
Acetabular autograft	1,106
Acetabular allograft	131
Acetabular synthetic	6

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic:	141,061 (96%)

Operating theatre

Conventional	88,947
Laminar flow	55,714
Space Suits	43,636

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	18,006	16
2	67,143	59
3	26,725	24
4	980	1

For the 15Y year period 2005 – 2019, there were 112,854 (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 advanced trainee into supervised and unsupervised. The following figures are for the fifteen year period 2005 – 2019.

Consultant	102,303
Advanced trainee supervised	9,653
Advanced trainee unsupervised	3,107
Basic trainee	2,069

Prosthesis usage

Conventional primary hips

Top 10 femoral components used in 2019

Exeter V40	3,289
Corail	1,662
Accolade II	546
Stemsys	388
C-Stem AMT	383
MS 30	324
Polarstem uncemented	282
Taperloc Complete	273
Echo Bi-Metric	245
CPT	232

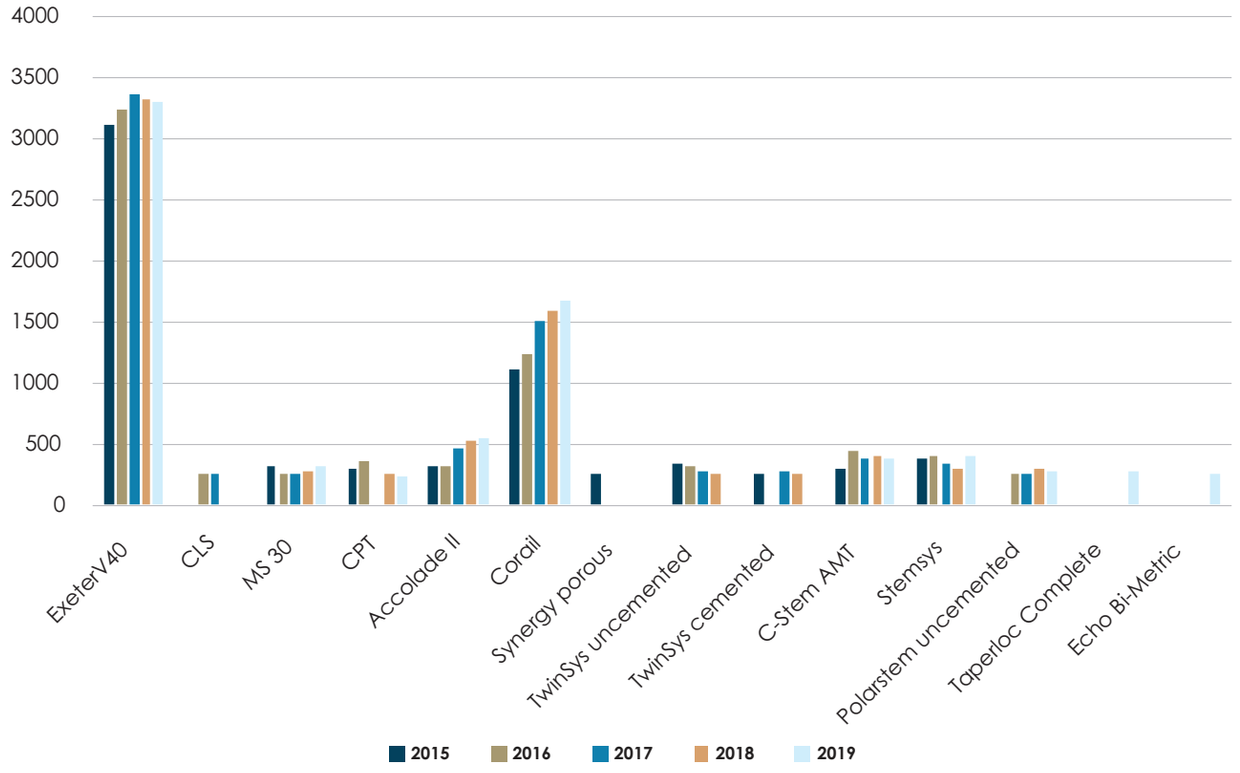
Top 10 acetabular components used in 2019

Pinnacle	2,521
Trident	1,318
RM Pressfit cup	982
Continuum TM	728
Tritanium	518
G7 acetabular	453
R3 porous	391
Fitmore	375
Exeter X3	356
Trilogy	264

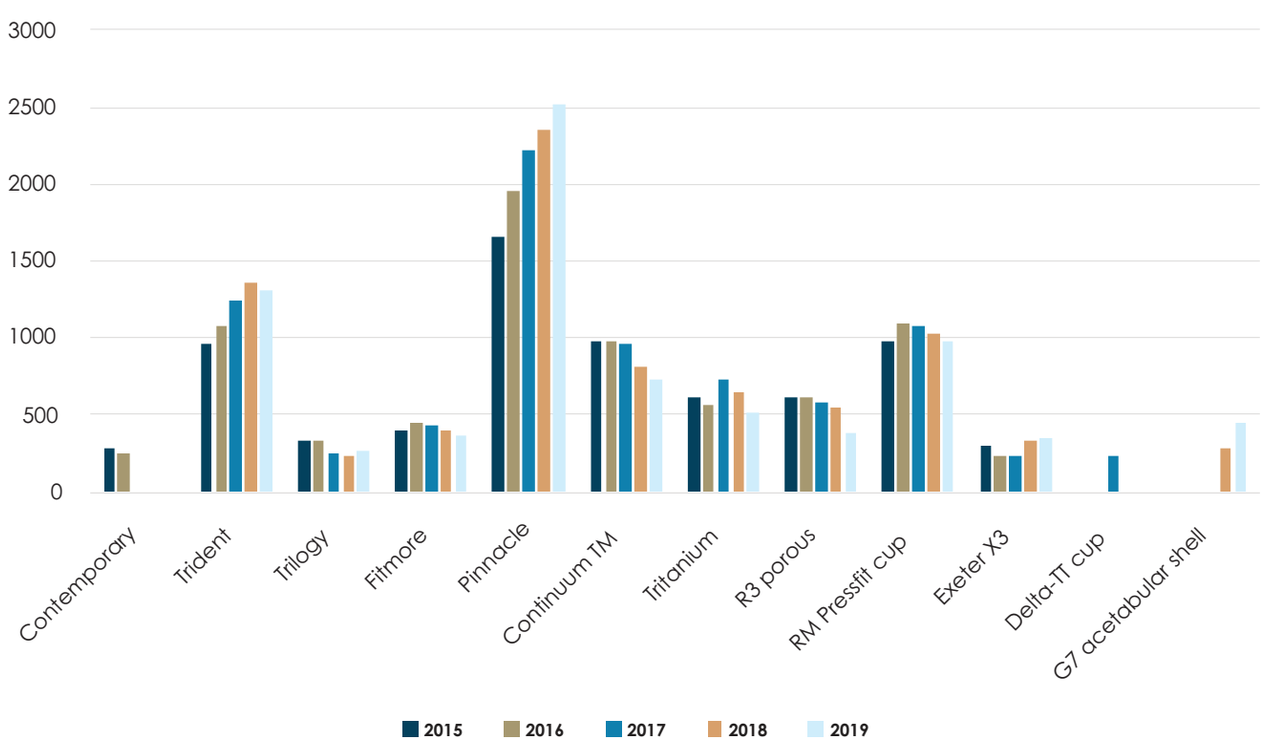
Top ten combinations used in 2019

Femur	Acetabulum	All Years	2019
Corail	Pinnacle	11,913	1,559
Exeter V40	Trident	11,414	1,024
Exeter V40	Pinnacle	2,811	359
Exeter V40	Exeter X3	2,453	350
C-Stem AMT	Pinnacle	2,688	348
Exeter V40	Tritanium	3,429	308
Exeter V40	RM Pressfit cup	2,647	261
Polarstem uncemented	R3 porous	1,743	224
Echo Bi-Metric	G7 acetabular	541	221
Accolade II	Trident	1,060	202

Most used femoral components per year for the five years 2015 – 2019

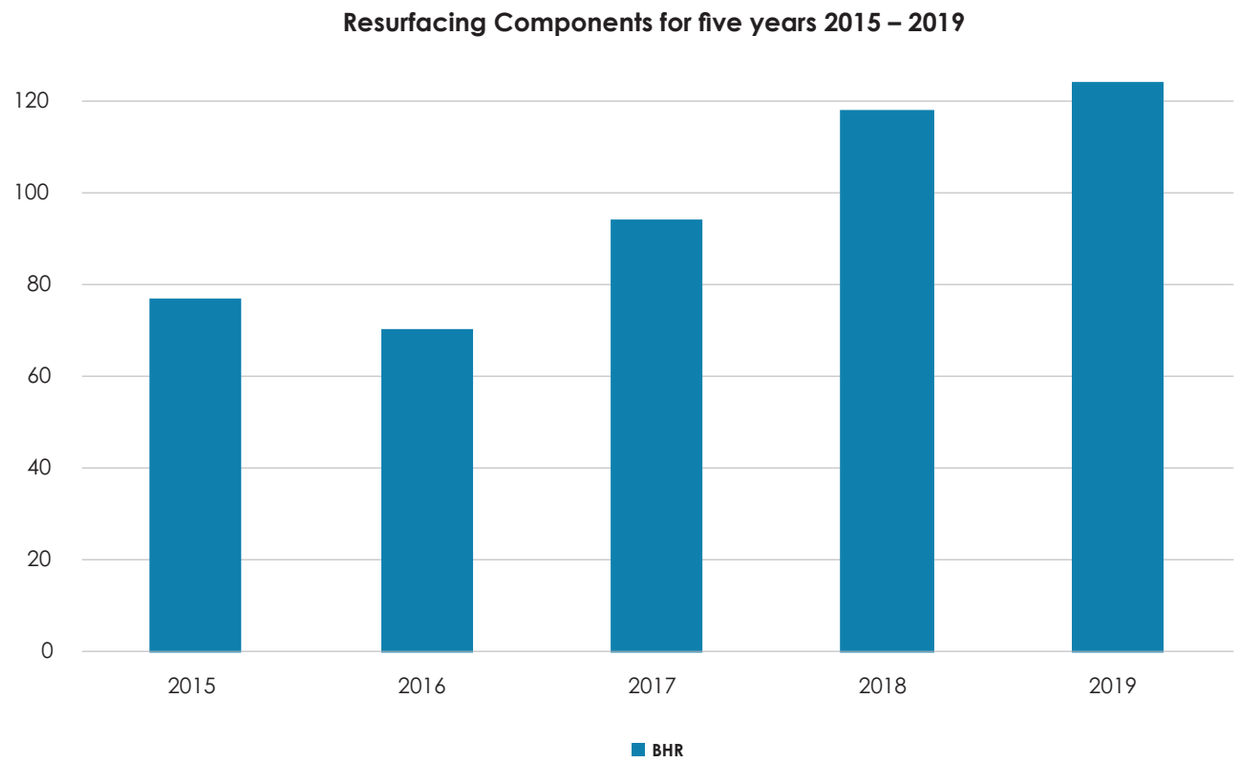


Most used acetabular components per year for five years 2015 – 2019



Resurfacing hips components used in 2019

BHR	124



Surgeon and Hospital Workload

Surgeons

In 2019, 241 surgeons performed 9,427 total hip replacements, an average of 39 procedures per surgeon.

Hospitals

In 2019, 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 one year period January 1999 – December 2019, there were 20,740 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	10,009	10,731
Percentage	48.26	51.74
Mean age	70.53	70.05
Maximum age	100.28	99.83
Minimum age	17.52	20.57
Standard dev.	11.97	10.99

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

Body Mass Index

For the 10 year period 2010 – 2019, there were 3,730 BMI registrations for revision hip replacements. The average BMI was 29 with a range of 15-55.

REVISION OF REGISTERED PRIMARY HIP ARTHROPLASTIES

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

There were 7,665 revisions of the 144,786 primary conventional hip replacements (5%) and 161 revisions of the 2,001 resurfacing hip replacements (8%) a total of 7,826 revisions.

Conventional hip arthroplasty analyses

Time to revision for conventional hips

Average	2,200 days
Maximum	7,532 days
Minimum	0 days
Standard deviation	1,899 days

Reason for revision

Dislocation	1,619
Loosening acetabular component	1,600
Loosening femoral component	1,276
Pain	1,106
Deep infection	991
Fracture femur	909

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	672	41.5	173	10.8	114	8.9	439	44.3	87	7.9	293	32.2
1	182	11.2	82	5.1	90	7.1	111	11.2	112	10.1	52	5.7
2	135	8.3	80	5.0	84	6.6	92	9.3	95	8.6	52	5.7
3	103	6.4	89	5.6	81	6.3	53	5.3	74	6.7	43	4.7
4	71	4.4	72	4.5	71	5.6	41	4.1	73	6.6	57	6.3
5	74	4.6	79	4.9	69	5.4	41	4.1	77	7.0	40	4.4
6	65	4.0	96	6.0	94	7.4	31	3.1	71	6.4	38	4.2
7	45	2.8	88	5.5	88	6.9	27	2.7	58	5.2	42	4.6
8	59	3.6	102	6.4	73	5.7	32	3.2	65	5.9	46	5.1
9	35	2.2	119	7.4	72	5.6	33	3.3	61	5.5	47	5.2
10	32	2.0	87	5.4	93	7.3	20	2.0	56	5.1	43	4.7
>10	146	9.0	533	33.3	347	27.2	71	7.2	277	25.0	156	17.2
Total	**1,619**	**100**	**1,600**	**100**	**1,276**	**100**	**991**	**100**	**1,106**	**100**	**909**	**100**

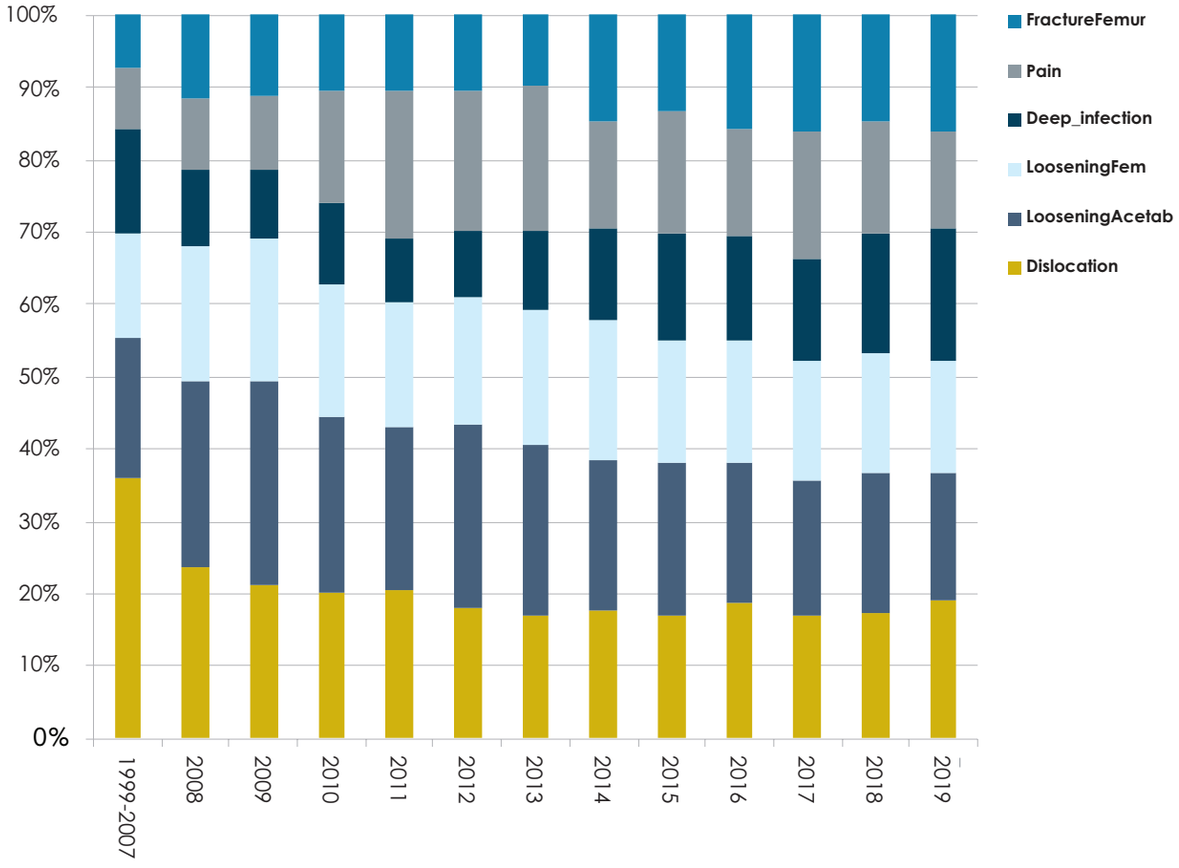
Analyses of numbers of the six main reasons for revision by year

	Dislocation	Loosening Acetabular	Loosening Femoral	Deep infection	Pain	Fracture Femur
	Count	Count	Count	Count	Count	Count
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
2019	130	122	106	126	94	109

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
2019	18.6	17.5	15.2	18.1	13.5	15.6

Comparison of the 6 main reasons for revision over time



RESURFACED HIP ANALYSES

There were 2,001 resurfacing hips registered for the period 2000 – 2019, and 161 (8%) have been revised.

Time to revision for resurfaced hips

Average	2,078 days
Maximum	4,501 days
Minimum	10 days
Standard deviation	1,231 days

Reason for revision

Pain	51
Loosening acetabulum	18
Deep infection	17
Loosening femoral component	18
Fracture femur	17
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

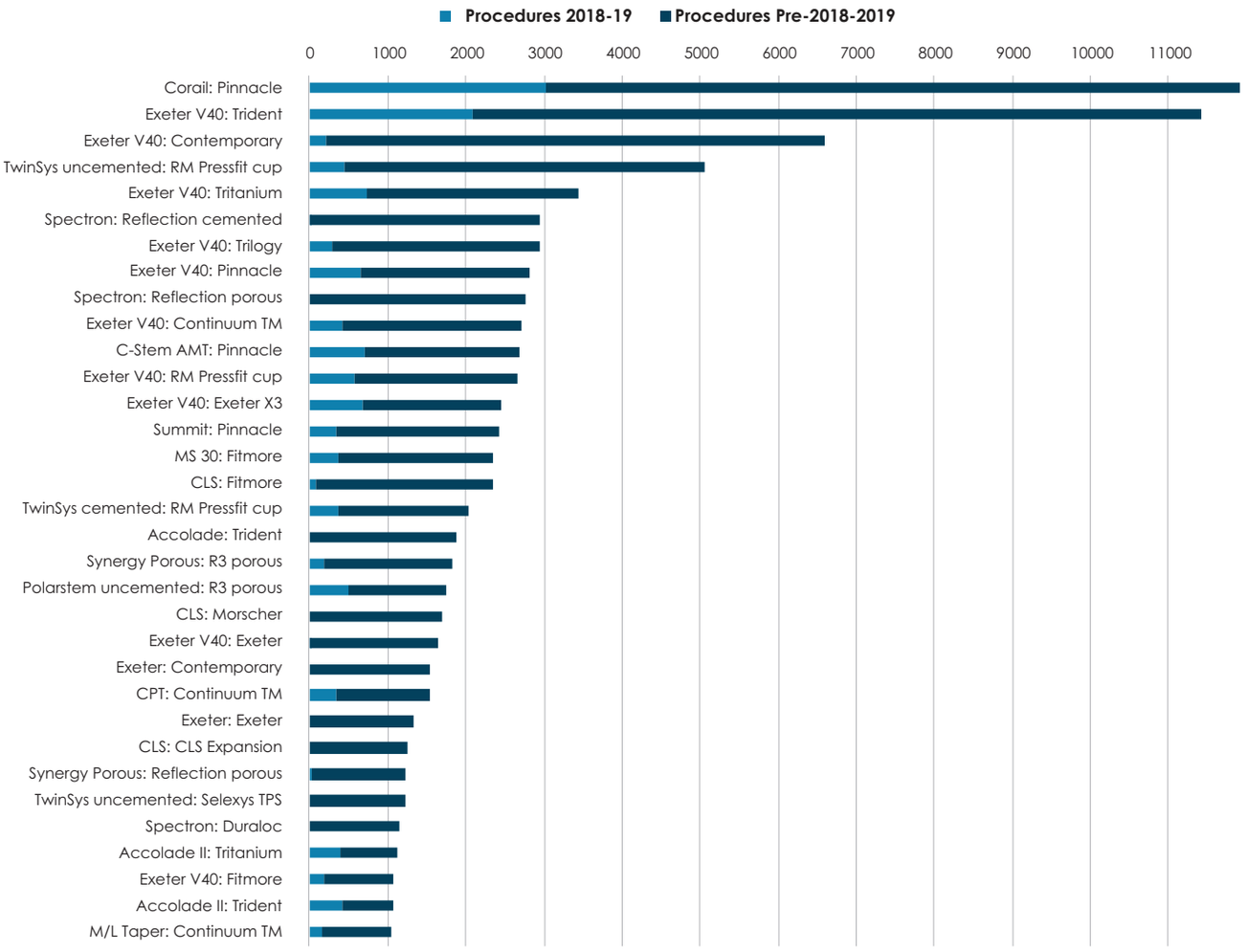
This is equivalent to the yearly revision rate expressed as a percentage and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post-operative follow up in calculating the revision rate. These rates 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

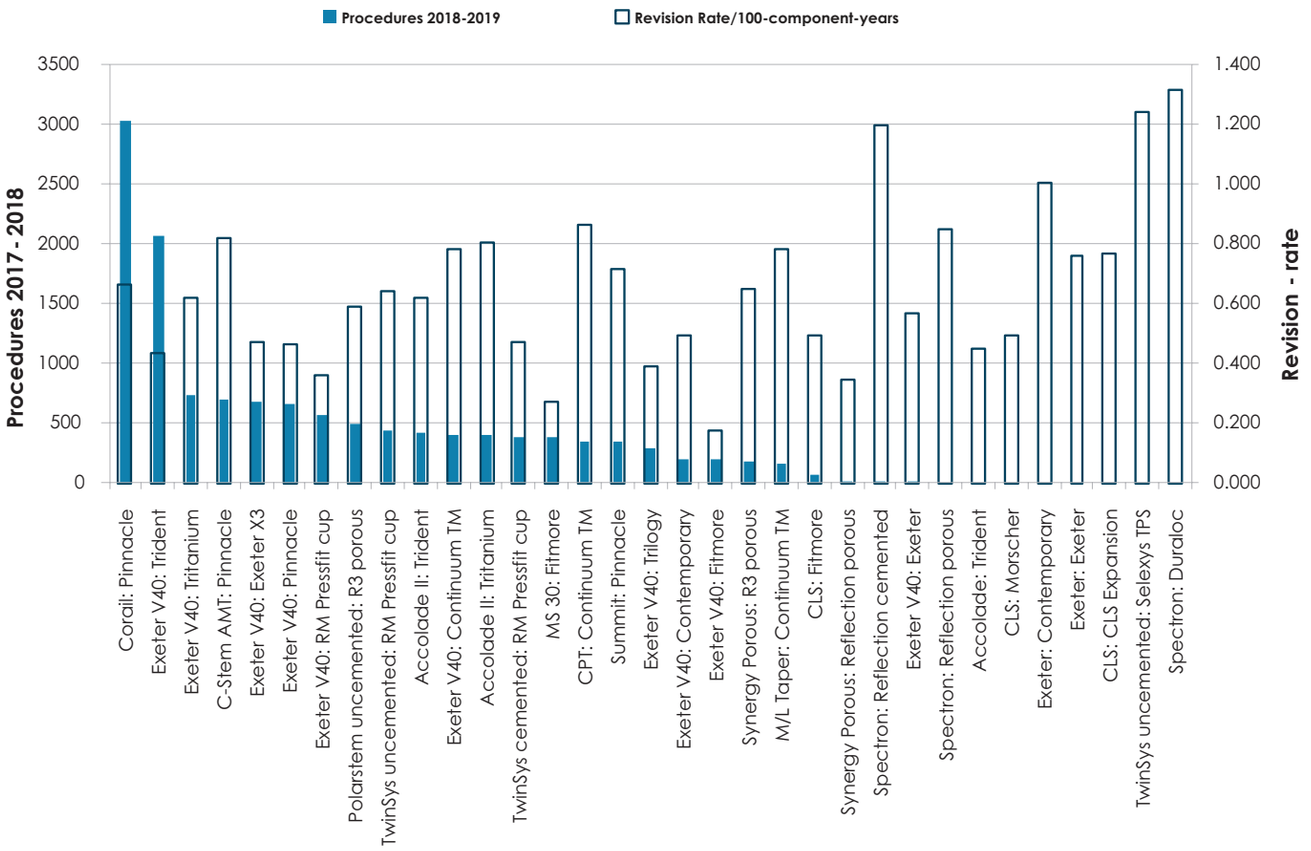
Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CI's) but sometimes significance can apply in the presence of CI overlap.

Conventional Primary Hip Arthroplasties

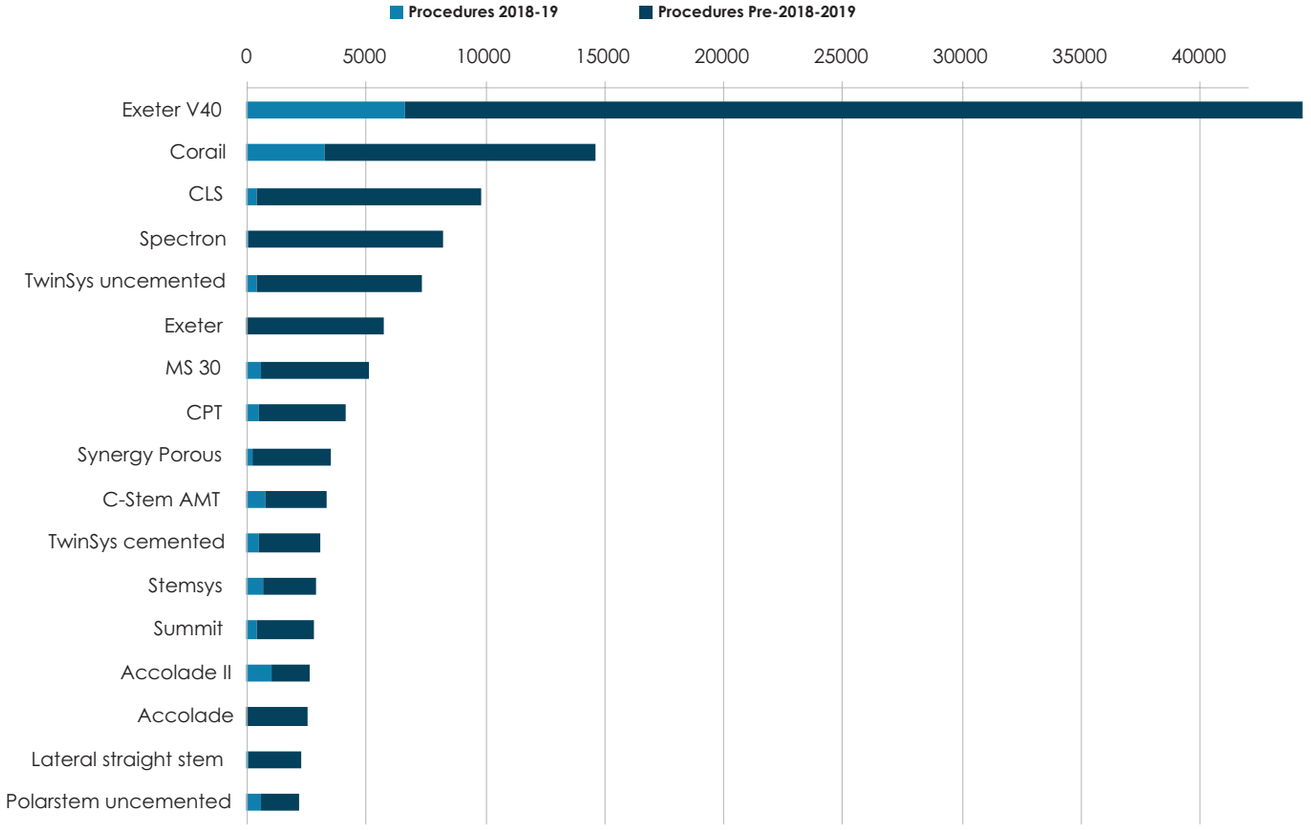
The figure below summarises the 33 Hip prostheses combinations with >1000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.



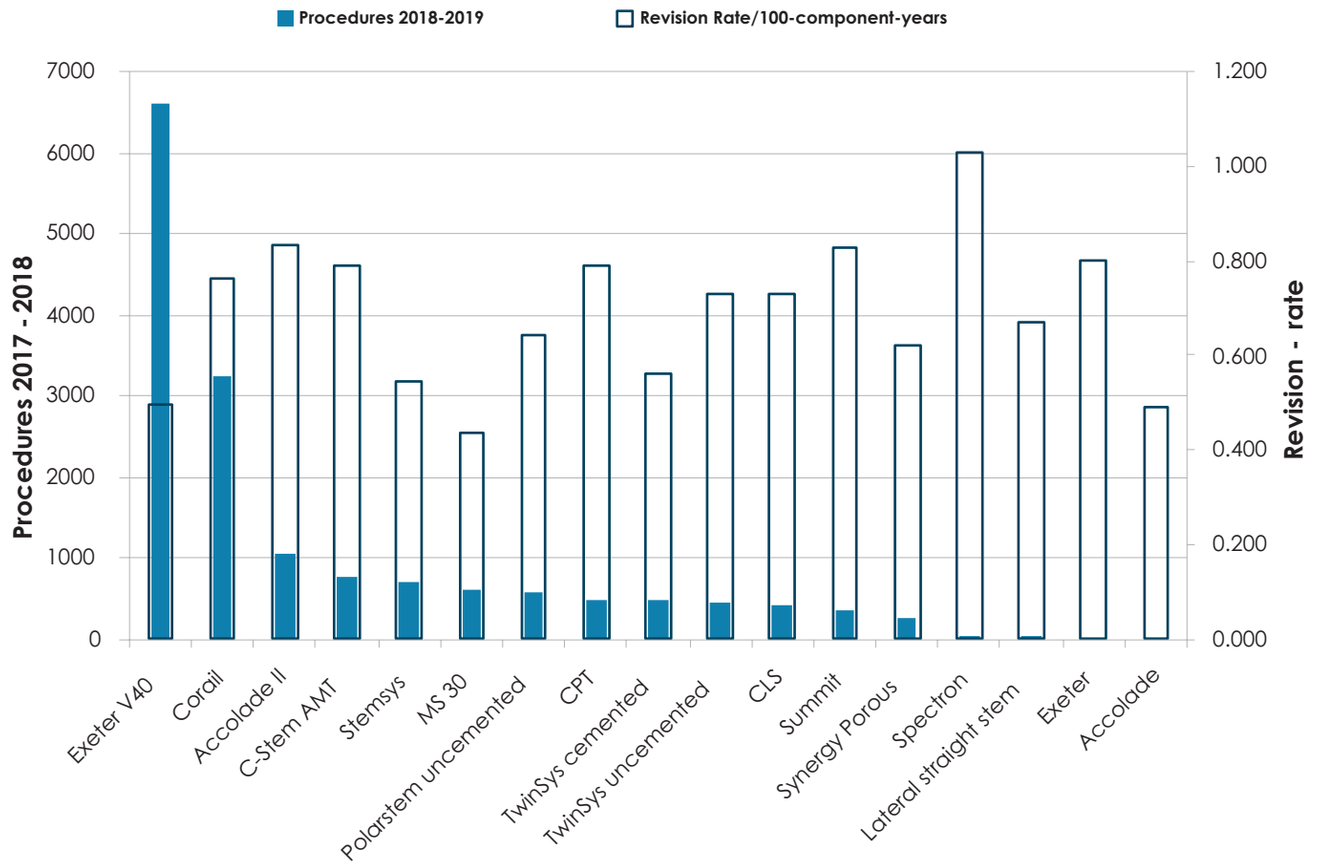
The figure below summarises the 33 Hip prostheses combinations with >1000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



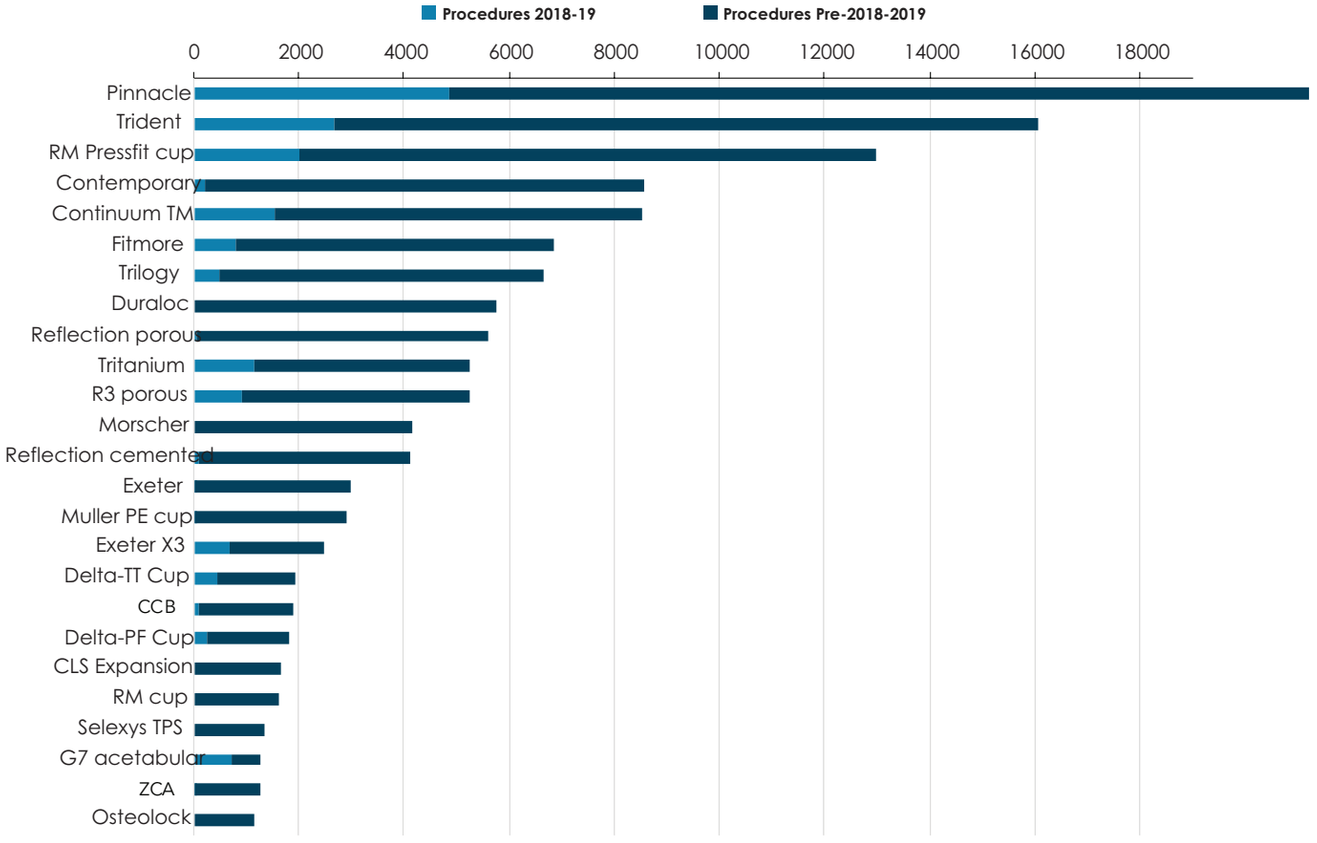
The figure below summarises the 17 Hip femur prostheses with >2000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.



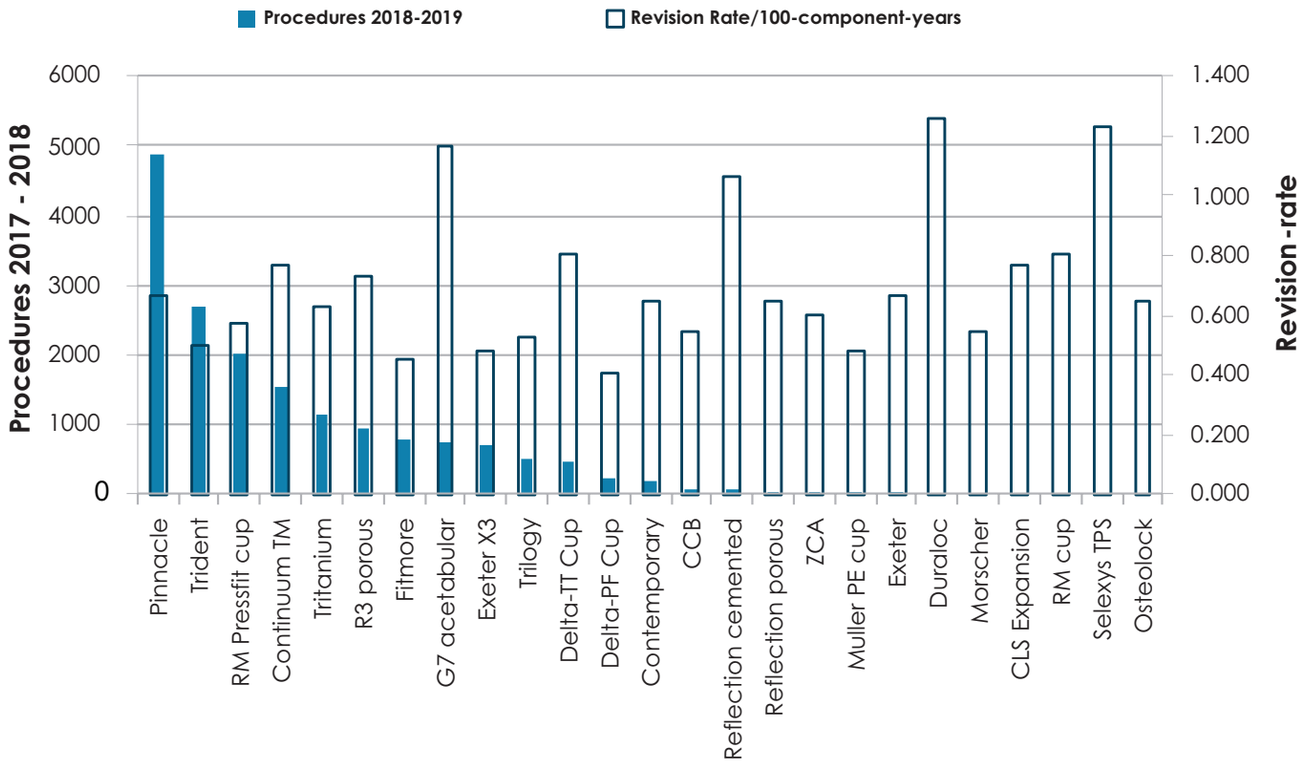
The figure below summarises the 17 Hip femur prostheses with >2000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



The figure below summarises the 25 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 25 Hip acetabular prostheses with >1000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



All Primary Total Hip Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component-years	Exact 95% Confidence Interval	
144,786	1,074,554	7,665	0.71	0.70	0.73

Revision versus hip prostheses combinations sorted on revision rate

(Minimum of 50 primary registered arthroplasties)

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Quadra-H	Acetabular Shell	84	41.1	2	4.86	0.59	17.57	73
Accolade II	Continuum TM	102	82.3	4	4.86	1.03	11.56	88
CPT	G7 acetabular	82	159.3	6	3.77	1.20	7.76	24
ABGII	RM Pressfit cup	89	293.5	8	2.73	1.18	5.37	8
MasterSL	Delta-TT Cup	90	126.2	3	2.38	0.49	6.94	31
Twin Sys cemented	Pinnacle	100	363.0	8	2.20	0.95	4.34	24
Accolade II	Fitmore	64	92.2	2	2.17	0.26	7.84	16
Polarstem uncemented	RM Pressfit cup	67	46.5	1	2.15	0.05	11.97	47
H-Max C	Delta-TT Cup	89	197.8	4	2.02	0.55	5.18	28
Exeter V40	Trident II Tritanium	202	106.5	2	1.88	0.10	6.78	174
Accolade II	RM Pressfit cup	95	207.9	3	1.44	0.30	4.22	16
Echo Bi-Metric	Continuum TM	123	292.5	4	1.37	0.37	3.50	17
Taperloc Complete	RM Pressfit cup	261	469.6	6	1.28	0.41	2.63	93

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Taperloc Complete	Continuum TM	180	240.2	3	1.25	0.26	3.65	72
C-Stem	Pinnacle	85	328.3	4	1.22	0.33	3.12	8
Taperloc Complete	G7 acetabular	324	668.3	8	1.20	0.47	2.26	62
Exeter V40	Trabecular Metal Shell	222	1,220.7	14	1.15	0.60	1.87	10
Exeter V40	G7 acetabular	203	351.9	4	1.14	0.24	2.91	91
CPT	Delta-TT Cup	103	264.9	3	1.13	0.23	3.31	24
Corail	RM Pressfit cup	153	640.8	7	1.09	0.39	2.14	9
Friendly	Delta-TT Cup	68	466.2	5	1.07	0.35	2.50	1
Avenir Muller uncemented	Continuum TM	182	1,215.4	13	1.07	0.54	1.78	3
Wagner cone stem	Continuum TM	51	188.3	2	1.06	0.06	3.41	6
Stemsys	Polymax	146	380.8	4	1.05	0.29	2.69	27
Optimys	RM Pressfit cup	195	286.5	3	1.05	0.22	3.06	88
H-Max S	Delta-PF Cup	225	790.3	8	1.01	0.44	1.99	31
CPT	Fitmore	195	1,207.8	12	0.99	0.51	1.74	4
S-Rom	Pinnacle	381	3,956.7	39	0.99	0.70	1.35	6
Corail	Fitmore	307	1,172.1	11	0.94	0.44	1.62	22
Stemsys	Agilis Ti-por	514	1,956.2	18	0.92	0.55	1.45	75
H-Max S	Trident	55	110.2	1	0.91	0.02	5.06	11
C-Stem AMT	RM Pressfit cup	130	576.0	5	0.87	0.28	2.03	1
CPT	Continuum TM	1,548	6,258.3	54	0.86	0.65	1.13	161
CPT	Trilogy	850	6,983.9	58	0.83	0.62	1.07	7
C-Stem AMT	Pinnacle	2,688	1,0261.7	84	0.82	0.65	1.01	348
Accolade II	Tritanium	1,126	3,361.6	27	0.80	0.53	1.17	191
H-Max S	Delta-TT Cup	826	3,651.6	29	0.79	0.52	1.12	89
Exeter V40	Continuum TM	2,710	12,485.5	98	0.78	0.63	0.95	171
M/L Taper	Continuum TM	1,043	5,097.6	40	0.78	0.55	1.06	39
CBC	RM Pressfit cup	445	3,059.3	24	0.78	0.50	1.17	1
Twin Sys cemented	CCB	449	2,572.0	19	0.74	0.43	1.13	8
Corail	Continuum TM	326	1,389.5	10	0.72	0.35	1.32	22
Summit	Pinnacle	2,413	15,539.1	111	0.71	0.59	0.86	164
Echo Bi-Metric	G7 acetabular	541	1,133.9	8	0.71	0.30	1.39	221
Trabecular Metal Stem	Continuum TM	472	2,573.3	18	0.70	0.41	1.11	25
CLS	RM Pressfit cup	592	4,349.9	30	0.69	0.47	0.98	25
CLS	Continuum TM	795	3,634.8	25	0.69	0.45	1.02	76
CLS	Tritanium	82	439.4	3	0.68	0.14	2.00	2
Corail	Pinnacle	11,913	58,534.7	388	0.66	0.60	0.73	1559
Exeter V40	R3 porous	675	2,742.5	18	0.66	0.39	1.04	69
C-Stem AMT	Marathon cemented	355	1,990.3	13	0.65	0.33	1.09	24

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
CLS	Trabecular Metal Shell	54	459.8	3	0.65	0.13	1.91	1
CPT	ZCA	550	5,681.9	37	0.65	0.45	0.89	5
CLS	Trilogy	654	4,767.0	31	0.65	0.44	0.92	58
Synergy Porous	R3 porous	1,829	9,568.5	62	0.65	0.49	0.82	50
Twin Sys uncemented	RM Pressfit cup	5,054	33,283.1	213	0.64	0.56	0.73	199
CLS	Reflection porous	382	3,295.7	21	0.64	0.39	0.97	9
Tri-Lock BPS	Pinnacle	64	480.6	3	0.62	0.09	1.67	1
Accolade II	Trident	1,060	3,083.1	19	0.62	0.37	0.96	202
Exeter V40	Tritanium	3,429	14,122.7	87	0.62	0.49	0.76	308
Stemsys	Fixa Ti Por	836	3,435.6	21	0.61	0.38	0.93	129
Exeter V40	Delta-TT Cup	258	990.3	6	0.61	0.22	1.32	35
M/L Taper	Trident	304	1,015.7	6	0.59	0.19	1.22	55
Polarstem uncemented	R3 porous	1,743	6,125.2	36	0.59	0.41	0.81	224
Lateral straight stem	Muller PE cup	752	7,354.9	40	0.54	0.39	0.74	2
CCA	CCB	776	6,353.4	34	0.54	0.37	0.75	7
Twin Sys uncemented	Continuum TM	135	941.4	5	0.53	0.17	1.24	2
Corail	Trident	99	569.5	3	0.53	0.11	1.54	11
Accolade II	Delta-TT Cup	73	192.6	1	0.52	0.01	2.89	1
CPCS	R3 porous	365	1,177.4	6	0.51	0.16	1.05	39
CLS	Fitmore	2,339	25,582.6	127	0.50	0.41	0.59	39
Exeter V40	Contemporary	6,586	53,146.2	262	0.49	0.44	0.56	82
Summit	Trilogy	178	1,433.0	7	0.49	0.20	1.01	10
Avenir Muller uncemented	RM Pressfit cup	53	206.7	1	0.48	0.01	2.70	2
Twin Sys cemented	RM Pressfit cup	2,045	10,149.1	48	0.47	0.35	0.63	181
Exeter V40	Exeter X3	2,453	9,344.4	44	0.47	0.34	0.63	350
Stemsys	Delta-PF Cup	464	1,500.7	7	0.47	0.19	0.96	68
Exeter V40	Pinnacle	2,811	13,960.7	65	0.47	0.36	0.59	359
Wagner cone stem	Fitmore	76	868.7	4	0.46	0.13	1.18	3
Exeter V40	Trident	11,414	72,796.6	318	0.44	0.39	0.49	1024
CLS	Pinnacle	99	697.9	3	0.43	0.09	1.26	9
Exeter V40	CCB	577	3,417.5	14	0.41	0.22	0.69	10
Corail	Tritanium	174	984.4	4	0.41	0.11	1.04	6
Stemsys	RM Pressfit cup	355	1,485.2	6	0.40	0.13	0.83	30
Exeter V40	Trilogy	2,944	21,899.0	86	0.39	0.31	0.48	139
Twin Sys cemented	Continuum TM	121	511.2	2	0.39	0.05	1.41	13
Avenir Muller uncemented	Fitmore	68	259.9	1	0.38	0.01	2.14	3

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Standard straight stem	Muller PE cup	632	5,953.6	22	0.37	0.22	0.55	3
Exeter V40	Reflection cemented	960	6,253.7	23	0.37	0.23	0.54	34
Exeter V40	RM Pressfit cup	2,647	13,125.0	47	0.36	0.26	0.48	261
Spectron	R3 porous	441	2,795.0	10	0.36	0.17	0.66	8
CPT	Pinnacle	65	561.0	2	0.36	0.04	1.29	1
MS 30	Continuum TM	437	1,981.5	7	0.35	0.14	0.73	33
Corail	Trilogy	216	1,135.8	4	0.35	0.10	0.90	9
Exeter V40	Reflection porous	476	4,419.5	14	0.32	0.17	0.53	1
Corail	Delta-PF Cup	81	959.7	3	0.31	0.06	0.91	1
Stemsys	DeltaMotion Cup	526	2,909.6	8	0.27	0.12	0.54	40
MS 30	Fitmore	2,357	16,029.6	44	0.27	0.20	0.37	182
Friendly	Delta-PF Cup	169	1,854.1	5	0.27	0.09	0.63	1
MS 30	Trilogy	360	2,230.5	6	0.27	0.10	0.59	29
Synergy Porous	Delta-PF Cup	96	865.6	2	0.23	0.03	0.83	8
CPT	ZCA all-poly cup	98	538.1	1	0.19	0.00	1.04	2
Exeter V40	Fitmore	1,067	5,672.3	10	0.18	0.08	0.31	103
Exeter V40	ZCA	98	620.5	1	0.16	0.00	0.90	5
C-Stem	Marathon cemented	94	388.4	0	0.00	0.00	0.95	5
Exeter V40	Polymax	79	132.6	0	0.00	0.00	2.78	16
Exeter V40	ZCA all-poly cup	109	499.7	0	0.00	0.00	0.74	5
MS 30	Pinnacle	66	150.7	0	0.00	0.00	2.45	34
Quadra-C	Acetabular Shell	62	39.4	0	0.00	0.00	9.37	47
Stemsys cemented	Delta-PF Cup	64	205.0	0	0.00	0.00	1.80	15
Stemsys cemented	RM Pressfit cup	77	204.5	0	0.00	0.00	1.80	13
Taperloc Complete	Delta-TT Cup	77	108.2	0	0.00	0.00	3.41	33

Revision versus hip prostheses combinations sorted on number of implantations

(Minimum of 50 primary registered arthroplasties)

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Corail	Pinnacle	11,913	58,534.7	388	0.66	0.60	0.73	1,559
Exeter V40	Trident	11,414	72,796.6	318	0.44	0.39	0.49	1,024
Exeter V40	Contemporary	6,586	53,146.2	262	0.49	0.44	0.56	82
Twin Sys uncemented	RM Pressfit cup	5,054	33,283.1	213	0.64	0.56	0.73	199
Exeter V40	Tritanium	3,429	14,122.7	87	0.62	0.49	0.76	308
Spectron	Reflection cemented	2,957	30,411.4	364	1.20	1.08	1.33	0
Exeter V40	Trilogy	2,944	21,899.0	86	0.39	0.31	0.48	139
Exeter V40	Pinnacle	2,811	13,960.7	65	0.47	0.36	0.59	359
Spectron	Reflection porous	2,755	29,101.1	246	0.85	0.74	0.96	0
Exeter V40	Continuum TM	2,710	12,485.5	98	0.78	0.63	0.95	171
C-Stem AMT	Pinnacle	2,688	10,261.7	84	0.82	0.65	1.01	348
Exeter V40	RM Pressfit cup	2,647	13,125.0	47	0.36	0.26	0.48	261
Exeter V40	Exeter X3	2,453	9,344.4	44	0.47	0.34	0.63	350
Summit	Pinnacle	2,413	15,539.1	111	0.71	0.59	0.86	164
MS 30	Fitmore	2,357	16,029.6	44	0.27	0.20	0.37	182
CLS	Fitmore	2,339	25,582.6	127	0.50	0.41	0.59	39
Twin Sys cemented	RM Pressfit cup	2,045	10,149.1	48	0.47	0.35	0.63	181
Accolade	Trident	1,867	21,992.8	98	0.45	0.36	0.54	0
Synergy Porous	R3 porous	1,829	9,568.5	62	0.65	0.49	0.82	50
Polarstem uncemented	R3 porous	1,743	6,125.2	36	0.59	0.41	0.81	224
CLS	Morscher	1,682	24,103.1	119	0.49	0.41	0.59	0
Exeter V40	Exeter	1,639	16,100.5	91	0.57	0.45	0.69	0
Exeter	Contemporary	1,551	18,676.0	187	1.00	0.86	1.16	0
CPT	Continuum TM	1,548	6,258.3	54	0.86	0.65	1.13	161
Exeter	Exeter	1,326	15,593.0	118	0.76	0.62	0.90	0
CLS	CLS Expansion	1,263	16,532.0	127	0.77	0.64	0.91	0
Synergy Porous	Reflection porous	1,238	12,932.7	45	0.35	0.25	0.47	0
Twin Sys uncemented	Selexys TPS	1,231	11,422.3	142	1.24	1.04	1.46	0
Spectron	Duraloc	1,151	14,173.7	186	1.31	1.13	1.51	0
Accolade II	Tritanium	1,126	3,361.6	27	0.80	0.53	1.17	191
Exeter V40	Fitmore	1,067	5,672.3	10	0.18	0.08	0.31	103
Accolade II	Trident	1,060	3,083.1	19	0.62	0.37	0.96	202
M/L Taper	Continuum TM	1,043	5,097.6	40	0.78	0.55	1.06	39
Exeter V40	Duraloc	987	11,342.7	113	1.00	0.82	1.20	0
Exeter V40	Reflection cemented	960	6,253.7	23	0.37	0.23	0.54	34

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
CPT	Trilogy	850	6,983.9	58	0.83	0.62	1.07	7
Exeter	Osteolock	836	11,463.0	76	0.66	0.52	0.83	0
Stemsys	Fixa Ti Por	836	3,435.6	21	0.61	0.38	0.93	129
H-Max S	Delta-TT Cup	826	3,651.6	29	0.79	0.52	1.12	89
CLS	Continuum TM	795	3,634.8	25	0.69	0.45	1.02	76
MS 30	Morscher	787	10,146.6	65	0.64	0.49	0.82	0
CCA	CCB	776	6,353.4	34	0.54	0.37	0.75	7
Lateral straight stem	Muller PE cup	752	7,354.9	40	0.54	0.39	0.74	2
CLS	Duraloc	699	9,516.1	103	1.08	0.88	1.31	0
Exeter V40	R3 porous	675	2,742.5	18	0.66	0.39	1.04	69
CLS	Trilogy	654	4,767.0	31	0.65	0.44	0.92	58
Standard straight stem	Muller PE cup	632	5,953.6	22	0.37	0.22	0.55	3
Exeter V40	Morscher	630	7,636.3	34	0.45	0.31	0.62	0
Elite plus	Duraloc	608	7,308.0	118	1.61	1.33	1.93	0
CLS	RM Pressfit cup	592	4,349.9	30	0.69	0.47	0.98	25
Exeter V40	CCB	577	3,417.5	14	0.41	0.22	0.69	10
Exeter	Duraloc	553	8,039.8	115	1.43	1.18	1.71	0
Exeter	Morscher	551	8,562.5	37	0.43	0.30	0.60	0
CPT	ZCA	550	5,681.9	37	0.65	0.45	0.89	5
Echo Bi-Metric	G7 acetabular	541	1,133.9	8	0.71	0.30	1.39	221
Lateral straight stem	RM cup	533	5,547.2	43	0.78	0.56	1.04	0
Stemsys	DeltaMotion Cup	526	2,909.6	8	0.27	0.12	0.54	40
Stemsys	Agilis Ti-por	514	1,956.2	18	0.92	0.55	1.45	75
SL monoblock	Muller PE cup	488	5,579.9	25	0.45	0.29	0.66	0
Exeter V40	Reflection porous	476	4,419.5	14	0.32	0.17	0.53	1
Trabecular Metal Stem	Continuum TM	472	2,573.3	18	0.70	0.41	1.11	25
Corail	Duraloc	464	5,440.9	52	0.96	0.71	1.24	0
Stemsys	Delta-PF Cup	464	1,500.7	7	0.47	0.19	0.96	68
MS 30	Muller PE cup	462	4,510.5	15	0.33	0.19	0.55	0
Charnley	Charnley	456	5,492.7	25	0.46	0.29	0.67	0
Twin Sys cemented	CCB	449	2,572.0	19	0.74	0.43	1.13	8
CBC	RM Pressfit cup	445	3,059.3	24	0.78	0.50	1.17	1
Spectron	R3 porous	441	2,795.0	10	0.36	0.17	0.66	8
MS 30	Continuum TM	437	1,981.5	7	0.35	0.14	0.73	33
Versys cemented	ZCA	391	4,349.0	30	0.69	0.47	0.98	0
CLS	Reflection porous	382	3,295.7	21	0.64	0.39	0.97	9
S-Rom	Pinnacle	381	3,956.7	39	0.99	0.70	1.35	6

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Twin Sys uncemented	Delta-PF Cup	370	3,351.9	3	0.09	0.01	0.24	0
CPCS	R3 porous	365	1,177.4	6	0.51	0.16	1.05	39
MS 30	Trilogy	360	2,230.5	6	0.27	0.10	0.59	29
C-Stem AMT	Marathon cemented	355	1,990.3	13	0.65	0.33	1.09	24
Stemsys	RM Pressfit cup	355	1,485.2	6	0.40	0.13	0.83	30
ABGII	Trident	342	4,301.8	39	0.91	0.64	1.24	0
Polarstem uncemented	Reflection porous	335	2,342.5	14	0.60	0.33	1.00	0
Corail	Continuum TM	326	1,389.5	10	0.72	0.35	1.32	22
Taperloc Complete	G7 acetabular	324	668.3	8	1.20	0.47	2.26	62
SL modular stem	RM cup	322	4,737.1	42	0.89	0.64	1.20	0
Corail	Fitmore	307	1,172.1	11	0.94	0.44	1.62	22
M/L Taper	Trident	304	1,015.7	6	0.59	0.19	1.22	55
Charnley	Charnley Cup Ogee	303	3,973.1	30	0.76	0.51	1.08	0
Elite plus	Charnley	298	3,754.3	24	0.64	0.41	0.95	0
Lateral straight stem	Weber	287	2,963.1	11	0.37	0.19	0.66	0
Elite plus	Elite Plus LPW	282	3,171.0	15	0.47	0.26	0.78	0
Versys	Trilogy	272	4,077.0	18	0.44	0.25	0.68	0
Exeter V40	Osteolock	270	3,331.2	15	0.45	0.24	0.72	0
Taperloc Complete	RM Pressfit cup	261	469.6	6	1.28	0.41	2.63	93
Exeter V40	Delta-TT Cup	258	990.3	6	0.61	0.22	1.32	35
Versys cemented	Trilogy	237	2,723.2	8	0.29	0.11	0.58	0
H-Max S	Delta-PF Cup	225	790.3	8	1.01	0.44	1.99	31
Exeter V40	Trabecular Metal Shell	222	1,220.7	14	1.15	0.60	1.87	10
Corail	Trilogy	216	1,135.8	4	0.35	0.10	0.90	9
M/L Taper	Trilogy	215	2,040.0	9	0.44	0.19	0.81	0
Exeter	Trilogy	213	3,050.8	14	0.46	0.25	0.77	0
CPT	Duraloc	212	2,547.0	17	0.67	0.37	1.04	0
Spectron	Morscher	210	2,864.0	32	1.12	0.76	1.58	0
Twin Sys uncemented	Trilogy	209	1,983.7	12	0.60	0.29	1.02	0
Exeter V40	G7 acetabular	203	351.9	4	1.14	0.24	2.91	91
Exeter V40	Trident II Tritanium	202	106.5	2	1.88	0.10	6.78	174
CLS	Durom	198	2,069.6	66	3.19	2.47	4.06	0
Optimys	RM Pressfit cup	195	286.5	3	1.05	0.22	3.06	88
CPT	Fitmore	195	1,207.8	12	0.99	0.51	1.74	4
CLS	Allofit	192	2,066.1	23	1.11	0.71	1.67	0
CBC	Expansys shell	183	1,902.5	28	1.47	0.98	2.13	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Avenir Muller uncemented	Continuum TM	182	1,215.4	13	1.07	0.54	1.78	3
Taperloc Complete	Continuum TM	180	240.2	3	1.25	0.26	3.65	72
Accolade	Pinnacle	180	1,752.4	3	0.17	0.04	0.50	0
Summit	Trilogy	178	1,433.0	7	0.49	0.20	1.01	10
Corail	Tritanium	174	984.4	4	0.41	0.11	1.04	6
Lateral straight stem	RM Pressfit cup	173	1,364.8	3	0.22	0.05	0.64	0
Friendly	Delta-PF Cup	169	1,854.1	5	0.27	0.09	0.63	1
CLS	Trident	165	1,974.9	14	0.71	0.37	1.16	0
Corail	ASR	156	1,263.4	84	6.65	5.30	8.23	0
Corail	RM Pressfit cup	153	640.8	7	1.09	0.39	2.14	9
Spectron	Mallory-Head	152	1,885.1	8	0.42	0.18	0.84	0
Accolade	Tritanium	152	1,197.3	3	0.25	0.05	0.73	0
Omnifit	Trident	149	1,922.3	13	0.68	0.34	1.12	0
Twin Sys cemented	RM cup	148	1,567.0	5	0.32	0.09	0.70	0
Stemsys	Polymax	146	380.8	4	1.05	0.29	2.69	27
CPT	Trident	145	1,732.1	12	0.69	0.36	1.21	0
Exeter V40	Bio-clad poly	140	1,057.7	7	0.66	0.27	1.36	0
Corail	Reflection porous	140	1,468.1	6	0.41	0.15	0.89	0
ABGII	Duraloc	139	2,009.6	41	2.04	1.44	2.74	0
Standard straight stem	RM cup	138	1,613.1	12	0.74	0.38	1.30	0
Standard straight stem	RM Pressfit cup	137	1,164.4	1	0.09	0.00	0.48	0
CCA	RM Pressfit cup	135	1,311.3	7	0.53	0.21	1.10	0
Twin Sys uncemented	Continuum TM	135	941.4	5	0.53	0.17	1.24	2
Corail	Ultima	135	1,238.3	4	0.32	0.09	0.83	0
Standard straight stem	Weber	134	1,332.9	4	0.30	0.08	0.77	0
S-Rom	ASR	130	834.9	95	11.38	9.15	13.84	0
C-Stem AMT	RM Pressfit cup	130	576.0	5	0.87	0.28	2.03	1
Exeter	CLS Expansion	129	1,617.4	10	0.62	0.30	1.14	0
MS 30	Contemporary	128	1,266.8	11	0.87	0.41	1.50	0
Echo Bi-Metric	Continuum TM	123	292.5	4	1.37	0.37	3.50	17
Exeter V40	Monoblock Acetabular Cup	123	1,660.5	5	0.30	0.10	0.70	0
Twin Sys uncemented	RM cup	122	1,133.1	9	0.79	0.36	1.51	0
Twin Sys cemented	Continuum TM	121	511.2	2	0.39	0.05	1.41	13
Exeter	Muller PE cup	119	1,500.6	8	0.53	0.23	1.05	0
ABG	Duraloc	116	1,920.9	41	2.13	1.53	2.90	0
Synergy Porous	BHR Acetabular Cup	114	1,097.8	41	3.73	2.64	5.01	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
Accolade	Muller PE cup	114	1,254.7	9	0.72	0.33	1.36	0
Prodigy	Duraloc	113	1,522.8	24	1.58	1.01	2.34	0
CLS	RM cup	113	1,245.9	17	1.36	0.76	2.14	0
Exeter	Bio-clad poly	113	1,260.3	7	0.56	0.22	1.14	0
Elite plus	Elite Plus Ogee	110	1,105.8	6	0.54	0.20	1.18	0
Exeter V40	ZCA all-poly cup	109	499.7	0	0.00	0.00	0.74	5
Basis	Reflection porous	108	916.2	2	0.22	0.03	0.79	0
ABGII	Delta-PF Cup	107	1,358.6	11	0.81	0.38	1.40	0
CLS	Weill ring	106	1,679.6	10	0.60	0.27	1.06	0
Mallory-Head	M2A	105	1,315.2	16	1.22	0.67	1.98	0
Avenir Muller uncemented	RM cup	105	912.1	3	0.33	0.07	0.96	0
CPT	Delta-TT Cup	103	264.9	3	1.13	0.23	3.31	24
Accolade II	Continuum TM	102	82.3	4	4.86	1.03	11.56	88
Summit	Duraloc	101	1,291.6	5	0.39	0.13	0.90	0
Twin Sys cemented	Pinnacle	100	363.0	8	2.20	0.95	4.34	24
Corail	Trident	99	569.5	3	0.53	0.11	1.54	11
CLS	Pinnacle	99	697.9	3	0.43	0.09	1.26	9
Avenir Muller uncemented	Pinnacle	99	890.3	3	0.34	0.05	0.90	0
CPT	ZCA all-poly cup	98	538.1	1	0.19	0.00	1.04	2
Exeter V40	ZCA	98	620.5	1	0.16	0.00	0.90	5
Lateral straight stem	ZCA	98	805.8	1	0.12	0.00	0.69	0
Synergy Porous	Delta-PF Cup	96	865.6	2	0.23	0.03	0.83	8
Accolade II	RM Pressfit cup	95	207.9	3	1.44	0.30	4.22	16
Corail	Monoblock Acetabular Cup	95	1,021.4	7	0.69	0.25	1.35	0
Exeter V40	Muller PE cup	94	942.8	3	0.32	0.07	0.93	0
MS 30	ZCA all-poly cup	94	574.7	1	0.17	0.00	0.97	0
C-Stem	Marathon cemented	94	388.4	0	0.00	0.00	0.95	5
Anthology Porous	BHR Acetabular Cup	93	766.0	51	6.66	4.96	8.75	0
Avenir Muller uncemented	Tritanium	91	723.0	2	0.28	0.03	1.00	0
MasterSL	Delta-TT Cup	90	126.2	3	2.38	0.49	6.94	31
MS 30	RM Pressfit cup	90	824.5	5	0.61	0.16	1.33	0
ABGII	RM Pressfit cup	89	293.5	8	2.73	1.18	5.37	8
H-Max C	Delta-TT Cup	89	197.8	4	2.02	0.55	5.18	28
Summit	ASR	88	786.5	37	4.70	3.31	6.48	0
Exeter V40	CLS Expansion	88	1,045.0	2	0.19	0.02	0.69	0
H-Max M	Delta-TT Cup	86	727.2	4	0.55	0.15	1.41	0
C-Stem	Pinnacle	85	328.3	4	1.22	0.33	3.12	8

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
CPT	Tritanium	85	686.6	6	0.87	0.32	1.90	0
Quadra-H	Acetabular Shell	84	41.1	2	4.86	0.59	17.57	73
CPT	Monoblock Acetabular Cup	84	995.3	8	0.80	0.31	1.52	0
Exeter	Trident	84	1,330.1	1	0.08	0.00	0.42	0
SL modular stem	Muller PE cup	83	1,126.1	2	0.18	0.02	0.64	0
CPT	G7 acetabular	82	159.3	6	3.77	1.20	7.76	24
CLS	Tritanium	82	439.4	3	0.68	0.14	2.00	2
Corail	Delta-PF Cup	81	959.7	3	0.31	0.06	0.91	1
CLS	Monoblock Acetabular Cup	80	911.2	5	0.55	0.15	1.20	0
Exeter V40	Polymax	79	132.6	0	0.00	0.00	2.78	16
S-Rom	Ultima	78	1,311.7	14	1.07	0.58	1.79	0
Spectron	Trident	78	928.5	6	0.65	0.21	1.33	0
Lateral straight stem	Continuum TM	78	538.3	3	0.56	0.08	1.49	0
Spectron	Fitmore	78	1,009.7	5	0.50	0.13	1.09	0
Corail	DeltaMotion Cup	78	596.0	1	0.17	0.00	0.93	0
Stemsys cemented	RM Pressfit cup	77	204.5	0	0.00	0.00	1.80	13
Taperloc Complete	Delta-TT Cup	77	108.2	0	0.00	0.00	3.41	33
Wagner cone stem	Fitmore	76	868.7	4	0.46	0.13	1.18	3
CCA	Contemporary	74	767.9	10	1.30	0.62	2.39	0
AML MMA	Duraloc	74	1,080.4	12	1.11	0.57	1.94	0
Trabecular Metal Stem	Monoblock Acetabular Cup	74	890.9	3	0.34	0.05	0.90	0
Accolade II	Delta-TT Cup	73	192.6	1	0.52	0.01	2.89	1
ABG	ABGII	72	1,136.6	16	1.41	0.80	2.29	0
Contemporary	Contemporary	71	922.6	12	1.30	0.67	2.27	0
H-Max M	Delta-PF Cup	71	587.1	7	1.19	0.43	2.34	0
Lateral straight stem	ZCA all-poly cup	70	478.4	0	0.00	0.00	0.77	0
Lateral straight stem	Trilogy	69	591.4	13	2.20	1.17	3.76	0
Anthology Porous	R3 porous	68	517.5	33	6.38	4.39	8.96	0
Friendly	Delta-TT Cup	68	466.2	5	1.07	0.35	2.50	1
Spectron	Biomex acet shell porous	68	1,065.7	5	0.47	0.15	1.09	0
Avenir Muller uncemented	Fitmore	68	259.9	1	0.38	0.01	2.14	3
Polarstem uncemented	RM Pressfit cup	67	46.5	1	2.15	0.05	11.97	47
ABGII	Pinnacle	67	714.1	5	0.70	0.23	1.63	0
Spectron	Muller PE cup	66	669.7	8	1.19	0.52	2.35	0
Furlong	Furlong	66	840.8	7	0.83	0.33	1.72	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval		Procedures 2019
MS 30	Pinnacle	66	150.7	0	0.00	0.00	2.45	34
Twin Sys cemented	Selexys TPS	65	505.3	6	1.19	0.44	2.58	0
CPT	Pinnacle	65	561.0	2	0.36	0.04	1.29	1
Accolade II	Fitmore	64	92.2	2	2.17	0.26	7.84	16
M/L Taper	Delta-TT Cup	64	378.3	5	1.32	0.43	3.08	0
Tri-Lock BPS	Pinnacle	64	480.6	3	0.62	0.09	1.67	1
Stemsys cemented	Delta-PF Cup	64	205.0	0	0.00	0.00	1.80	15
Quadra-C	Acetabular Shell	62	39.4	0	0.00	0.00	9.37	47
CLS	Artek	59	737.7	26	3.52	2.25	5.08	0
CBC	Fitmore	59	650.2	5	0.77	0.25	1.79	0
Twin Sys cemented	Reflection porous	59	230.7	0	0.00	0.00	1.60	0
Echo Bi-Metric	Exceed ABT Ringloc-X	57	369.2	1	0.27	0.01	1.51	0
H-Max S	Trident	55	110.2	1	0.91	0.02	5.06	11
MS 30	Duraloc	55	802.3	7	0.87	0.31	1.71	0
C-Stem	Elite Plus Ogee	55	560.3	2	0.36	0.04	1.29	0
Synergy Porous	Continuum TM	55	175.5	0	0.00	0.00	2.10	0
CLS	Trabecular Metal Shell	54	459.8	3	0.65	0.13	1.91	1
AML	Duraloc	53	810.6	8	0.99	0.43	1.94	0
C-Stem	Duraloc	53	657.4	6	0.91	0.33	1.99	0
Avenir Muller uncemented	RM Pressfit cup	53	206.7	1	0.48	0.01	2.70	2
Exeter V40	Weber	53	587.8	1	0.17	0.00	0.95	0
Wagner cone stem	Continuum TM	51	188.3	2	1.06	0.06	3.41	6
Standard straight stem	ZCA all-poly cup	50	328.1	1	0.30	0.00	1.70	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	No. revised	Rate/100 Component-years	Exact 95% confidence interval	
Exeter V40	Contemporary	6,586	53,146.2	262	0.49	0.44	0.56
Spectron	Reflection cemented	2,957	30,411.4	364	1.20	1.08	1.33
Exeter V40	Exeter X3	2,453	9,344.4	44	0.47	0.34	0.63
Exeter V40	Exeter	1,639	16,100.5	91	0.57	0.45	0.69
Exeter	Contemporary	1,551	18,676.0	187	1.00	0.86	1.16
Exeter	Exeter	1,326	15,593.0	118	0.76	0.62	0.90
Exeter V40	Reflection cemented	960	6,253.7	23	0.37	0.23	0.54
CCA	CCB	776	6,353.4	34	0.54	0.37	0.75
Lateral straight stem	Muller PE cup	752	7,354.9	40	0.54	0.39	0.74
Standard straight stem	Muller PE cup	632	5,953.6	22	0.37	0.22	0.55
Exeter V40	CCB	577	3,417.5	14	0.41	0.22	0.69
CPT	ZCA	550	5,681.9	37	0.65	0.45	0.89
SL monoblock	Muller PE cup	488	5,579.9	25	0.45	0.29	0.66
MS 30	Muller PE cup	462	4,510.5	15	0.33	0.19	0.55
Charnley	Charnley	456	5,492.7	25	0.46	0.29	0.67
Twin Sys cemented	CCB	449	2,572.0	19	0.74	0.43	1.13
Versys cemented	ZCA	391	4,349.0	30	0.69	0.47	0.98
C-Stem AMT	Marathon cemented	355	1,990.3	13	0.65	0.33	1.09
Charnley	Charnley Cup Ogee	303	3,973.1	30	0.76	0.51	1.08
Elite plus	Charnley	298	3,754.3	24	0.64	0.41	0.95
Lateral straight stem	Weber	287	2,963.1	11	0.37	0.19	0.66
Elite plus	Elite Plus LPW	282	3,171.0	15	0.47	0.26	0.78
Exeter V40	Bio-clad poly	140	1,057.7	7	0.66	0.27	1.36
Standard straight stem	Weber	134	1,332.9	4	0.30	0.08	0.77
MS 30	Contemporary	128	1,266.8	11	0.87	0.41	1.50
Exeter	Muller PE cup	119	1,500.6	8	0.53	0.23	1.05
Exeter	Bio-clad poly	113	1,260.3	7	0.56	0.22	1.14
Elite plus	Elite Plus Ogee	110	1,105.8	6	0.54	0.20	1.18
Exeter V40	ZCA all-poly cup	109	499.7	0	0.00	0.00	0.74
CPT	ZCA all-poly cup	98	538.1	1	0.19	0.00	1.04
Exeter V40	ZCA	98	620.5	1	0.16	0.00	0.90
Lateral straight stem	ZCA	98	805.8	1	0.12	0.00	0.69
C-Stem	Marathon cemented	94	388.4	0	0.00	0.00	0.95

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100 Component-years	Exact 95% confidence interval	
Exeter V40	Muller PE cup	94	942.8	3	0.32	0.07	0.93
MS 30	ZCA all-poly cup	94	574.7	1	0.17	0.00	0.97
SL modular stem	Muller PE cup	83	1,126.1	2	0.18	0.02	0.64
CCA	Contemporary	74	767.9	10	1.30	0.62	2.39
Contemporary	Contemporary	71	922.6	12	1.30	0.67	2.27
Lateral straight stem	ZCA all-poly cup	70	478.4	0	0.00	0.00	0.77
Spectron	Muller PE cup	66	669.7	8	1.19	0.52	2.35
C-Stem	Elite Plus Ogee	55	560.3	2	0.36	0.04	1.29
Exeter V40	Weber	53	587.8	1	0.17	0.00	0.95
Standard straight stem	ZCA all-poly cup	50	328.1	1	0.30	0.00	1.70

Uncemented

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
Corail	Pinnacle	11,913	58,534.7	388	0.66	0.60	0.73
Twin Sys uncemented	RM Pressfit cup	5,054	33,283.1	213	0.64	0.56	0.73
Summit	Pinnacle	2,413	15,539.1	111	0.71	0.59	0.86
CLS	Fitmore	2,339	25,582.6	127	0.50	0.41	0.59
Accolade	Trident	1,867	21,992.8	98	0.45	0.36	0.54
Synergy Porous	R3 porous	1,829	9,568.5	62	0.65	0.49	0.82
Polarstem uncemented	R3 porous	1,743	6,125.2	36	0.59	0.41	0.81
CLS	Morscher	1,682	24,103.1	119	0.49	0.41	0.59
CLS	CLS Expansion	1,263	16,532.0	127	0.77	0.64	0.91
Synergy Porous	Reflection porous	1,238	12,932.7	45	0.35	0.25	0.47
Twin Sys uncemented	Selexys TPS	1,231	11,422.3	142	1.24	1.04	1.46
Accolade II	Tritanium	1,126	3,361.6	27	0.80	0.53	1.17
Accolade II	Trident	1,060	3,083.1	19	0.62	0.37	0.96
M/L Taper	Continuum TM	1,043	5,097.6	40	0.78	0.55	1.06
Stemsys	Fixa Ti Por	836	3,435.6	21	0.61	0.38	0.93
H-Max S	Delta-TT Cup	826	3,651.6	29	0.79	0.52	1.12
CLS	Continuum TM	795	3,634.8	25	0.69	0.45	1.02
CLS	Duraloc	699	9,516.1	103	1.08	0.88	1.31
CLS	Trilogy	654	4,767.0	31	0.65	0.44	0.92
CLS	RM Pressfit cup	592	4,349.9	30	0.69	0.47	0.98
Echo Bi-Metric	G7 acetabular	541	1,133.9	8	0.71	0.30	1.39
Stemsys	DeltaMotion Cup	526	2,909.6	8	0.27	0.12	0.54
Stemsys	Agilis Ti-por	514	1,956.2	18	0.92	0.55	1.45
Trabecular Metal Stem	Continuum TM	472	2,573.3	18	0.70	0.41	1.11
Corail	Duraloc	464	5,440.9	52	0.96	0.71	1.24

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
Stemsys	Delta-PF Cup	464	1,500.7	7	0.47	0.19	0.96
CBC	RM Pressfit cup	445	3,059.3	24	0.78	0.50	1.17
CLS	Reflection porous	382	3,295.7	21	0.64	0.39	0.97
S-Rom	Pinnacle	381	3,956.7	39	0.99	0.70	1.35
Twin Sys uncemented	Delta-PF Cup	370	3,351.9	3	0.09	0.01	0.24
Stemsys	RM Pressfit cup	355	1,485.2	6	0.40	0.13	0.83
ABGII	Trident	342	4,301.8	39	0.91	0.64	1.24
Polarstem uncemented	Reflection porous	335	2,342.5	14	0.60	0.33	1.00
Corail	Continuum TM	326	1,389.5	10	0.72	0.35	1.32
Taperloc Complete	G7 acetabular	324	668.3	8	1.20	0.47	2.26
Corail	Fitmore	307	1,172.1	11	0.94	0.44	1.62
M/L Taper	Trident	304	1,015.7	6	0.59	0.19	1.22
Versys	Trilogy	272	4,077.0	18	0.44	0.25	0.68
Taperloc Complete	RM Pressfit cup	261	469.6	6	1.28	0.41	2.63
H-Max S	Delta-PF Cup	225	790.3	8	1.01	0.44	1.99
Corail	Trilogy	216	1,135.8	4	0.35	0.10	0.90
M/L Taper	Trilogy	215	2,040.0	9	0.44	0.19	0.81
Twin Sys uncemented	Trilogy	209	1,983.7	12	0.60	0.29	1.02
CLS	Durom	198	2,069.6	66	3.19	2.47	4.06
Optimys	RM Pressfit cup	195	286.5	3	1.05	0.22	3.06
CLS	Allofit	192	2,066.1	23	1.11	0.71	1.67
CBC	Expansys shell	183	1,902.5	28	1.47	0.98	2.13
Avenir Muller uncemented	Continuum TM	182	1,215.4	13	1.07	0.54	1.78
Accolade	Pinnacle	180	1,752.4	3	0.17	0.04	0.50
Taperloc Complete	Continuum TM	180	240.2	3	1.25	0.26	3.65
Summit	Trilogy	178	1,433.0	7	0.49	0.20	1.01
Corail	Tritanium	174	984.4	4	0.41	0.11	1.04
CLS	Trident	165	1,974.9	14	0.71	0.37	1.16
Corail	ASR	156	1,263.4	84	6.65	5.30	8.23
Corail	RM Pressfit cup	153	640.8	7	1.09	0.39	2.14
Accolade	Tritanium	152	1,197.3	3	0.25	0.05	0.73
Stemsys	Polymax	146	380.8	4	1.05	0.29	2.69
Corail	Reflection porous	140	1,468.1	6	0.41	0.15	0.89
ABGII	Duraloc	139	2,009.6	41	2.04	1.44	2.74
Twin Sys uncemented	Continuum TM	135	941.4	5	0.53	0.17	1.24
S-Rom	ASR	130	834.9	95	11.38	9.15	13.84
Omnifit	Trident	126	1,658.1	12	0.72	0.35	1.23
Echo Bi-Metric	Continuum TM	123	292.5	4	1.37	0.37	3.50
Twin Sys uncemented	RM cup	122	1,133.1	9	0.79	0.36	1.51
ABG	Duraloc	116	1,920.9	41	2.13	1.53	2.90

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
Synergy Porous	BHR Acetabular Cup	114	1,097.8	41	3.73	2.64	5.01
CLS	RM cup	113	1,245.9	17	1.36	0.76	2.14
Prodigy	Duraloc	113	1,522.8	24	1.58	1.01	2.34
ABGII	Delta-PF Cup	107	1,358.6	11	0.81	0.38	1.40
CLS	Weill ring	106	1,679.6	10	0.60	0.27	1.06
Avenir Muller uncemented	RM cup	105	912.1	3	0.33	0.07	0.96
Mallory-Head	M2A	105	1,315.2	16	1.22	0.67	1.98
Accolade II	Continuum TM	102	82.3	4	4.86	1.03	11.56
Summit	Duraloc	101	1,291.6	5	0.39	0.13	0.90
Avenir Muller uncemented	Pinnacle	99	890.3	3	0.34	0.05	0.90
CLS	Pinnacle	99	697.9	3	0.43	0.09	1.26
Corail	Trident	99	569.5	3	0.53	0.11	1.54
Synergy Porous	Delta-PF Cup	96	865.6	2	0.23	0.03	0.83
Accolade II	RM Pressfit cup	95	207.9	3	1.44	0.30	4.22
Corail	Monoblock Acetabular Cup	95	1,021.4	7	0.69	0.25	1.35
Anthology Porous	BHR Acetabular Cup	91	752.5	50	6.64	4.87	8.68
Avenir Muller uncemented	Tritanium	91	723.0	2	0.28	0.03	1.00
MasterSL	Delta-TT Cup	90	126.2	3	2.38	0.49	6.94
ABGII	RM Pressfit cup	89	293.5	8	2.73	1.18	5.37
Summit	ASR	88	786.5	37	4.70	3.31	6.48
H-Max M	Delta-TT Cup	86	727.2	4	0.55	0.15	1.41
Quadra-H	Acetabular Shell	84	41.1	2	4.86	0.59	17.57
CLS	Tritanium	82	439.4	3	0.68	0.14	2.00
Corail	Delta-PF Cup	81	959.7	3	0.31	0.06	0.91
CLS	Monoblock Acetabular Cup	80	911.2	5	0.55	0.15	1.20
Corail	DeltaMotion Cup	78	596.0	1	0.17	0.00	0.93
S-Rom	Ultima	78	1,311.7	14	1.07	0.58	1.79
Taperloc Complete	Delta-TT Cup	77	108.2	0	0.00	0.00	3.41
Wagner cone stem	Fitmore	76	868.7	4	0.46	0.13	1.18
AML MMA	Duraloc	74	1,080.4	12	1.11	0.57	1.94
Trabecular Metal Stem	Monoblock Acetabular Cup	74	890.9	3	0.34	0.05	0.90
Accolade II	Delta-TT Cup	73	192.6	1	0.52	0.01	2.89
ABG	ABGII	72	1,136.6	16	1.41	0.80	2.29
H-Max M	Delta-PF Cup	71	587.1	7	1.19	0.43	2.34
Anthology Porous	R3 porous	68	517.5	33	6.38	4.39	8.96
Avenir Muller uncemented	Fitmore	68	259.9	1	0.38	0.01	2.14
ABGII	Pinnacle	67	714.1	5	0.70	0.23	1.63

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
Polarstem uncemented	RM Pressfit cup	67	46.5	1	2.15	0.05	11.97
Furlong	Furlong	66	840.8	7	0.83	0.33	1.72
Accolade II	Fitmore	64	92.2	2	2.17	0.26	7.84
M/L Taper	Delta-TT Cup	64	378.3	5	1.32	0.43	3.08
Tri-Lock BPS	Pinnacle	64	480.6	3	0.62	0.09	1.67
CBC	Fitmore	59	650.2	5	0.77	0.25	1.79
CLS	Artek	59	737.7	26	3.52	2.25	5.08
Echo Bi-Metric	Exceed ABT Ringloc-X	57	369.2	1	0.27	0.01	1.51
H-Max S	Trident	55	110.2	1	0.91	0.02	5.06
Synergy Porous	Continuum TM	55	175.5	0	0.00	0.00	2.10
CLS	Trabecular Metal Shell	54	459.8	3	0.65	0.13	1.91
AML	Duraloc	53	810.6	8	0.99	0.43	1.94
Avenir Muller uncemented	RM Pressfit cup	53	206.7	1	0.48	0.01	2.70
Wagner cone stem	Continuum TM	51	188.3	2	1.06	0.06	3.41

Hybrid

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
Exeter V40	Trident	11,414	72,796.6	318	0.44	0.39	0.49
Exeter V40	Tritanium	3,429	14,122.7	87	0.62	0.49	0.76
Exeter V40	Trilogy	2,944	21,899.0	86	0.39	0.31	0.48
Exeter V40	Pinnacle	2,811	13,960.7	65	0.47	0.36	0.59
Spectron	Reflection porous	2,755	29,101.1	246	0.85	0.74	0.96
Exeter V40	Continuum TM	2,710	12,485.5	98	0.78	0.63	0.95
C-Stem AMT	Pinnacle	2,688	10,261.7	84	0.82	0.65	1.01
Exeter V40	RM Pressfit cup	2,647	13,125.0	47	0.36	0.26	0.48
MS 30	Fitmore	2,357	16,029.6	44	0.27	0.20	0.37
Twin Sys cemented	RM Pressfit cup	2,045	10,149.1	48	0.47	0.35	0.63
CPT	Continuum TM	1,548	6,258.3	54	0.86	0.65	1.13
Spectron	Duraloc	1,151	14,173.7	186	1.31	1.13	1.51
Exeter V40	Fitmore	1,067	5,672.3	10	0.18	0.08	0.31
Exeter V40	Duraloc	987	11,342.7	113	1.00	0.82	1.20
CPT	Trilogy	850	6,983.9	58	0.83	0.62	1.07
Exeter	Osteolock	836	11,463.0	76	0.66	0.52	0.83
MS 30	Morscher	787	10,146.6	65	0.64	0.49	0.82
Exeter V40	R3 porous	675	2,742.5	18	0.66	0.39	1.04
Exeter V40	Morscher	630	7,636.3	34	0.45	0.31	0.62
Elite plus	Duraloc	608	7,308.0	118	1.61	1.33	1.93
Exeter	Duraloc	553	8,039.8	115	1.43	1.18	1.71

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
Exeter	Morscher	551	8,562.5	37	0.43	0.30	0.60
Lateral straight stem	RM cup	533	5,547.2	43	0.78	0.56	1.04
Exeter V40	Reflection porous	476	4,419.5	14	0.32	0.17	0.53
Spectron	R3 porous	441	2,795.0	10	0.36	0.17	0.66
MS 30	Continuum TM	437	1,981.5	7	0.35	0.14	0.73
CPCS	R3 porous	365	1,177.4	6	0.51	0.16	1.05
MS 30	Trilogy	360	2,230.5	6	0.27	0.10	0.59
SL modular stem	RM cup	322	4,737.1	42	0.89	0.64	1.20
Exeter V40	Osteolock	270	3,331.2	15	0.45	0.24	0.72
Exeter V40	Delta-TT Cup	258	990.3	6	0.61	0.22	1.32
Versys cemented	Trilogy	237	2,723.2	8	0.29	0.11	0.58
Exeter V40	Trabecular Metal Shell	222	1,220.7	14	1.15	0.60	1.87
Exeter	Trilogy	213	3,050.8	14	0.46	0.25	0.77
CPT	Duraloc	212	2,547.0	17	0.67	0.37	1.04
Spectron	Morscher	210	2,864.0	32	1.12	0.76	1.58
Exeter V40	G7 acetabular	203	351.9	4	1.14	0.24	2.91
Exeter V40	Trident II Tritanium	202	106.5	2	1.88	0.10	6.78
CPT	Fitmore	195	1,207.8	12	0.99	0.51	1.74
Lateral straight stem	RM Pressfit cup	173	1,364.8	3	0.22	0.05	0.64
Friendly	Delta-PF Cup	169	1,854.1	5	0.27	0.09	0.63
Spectron	Mallory-Head	152	1,885.1	8	0.42	0.18	0.84
Twin Sys cemented	RM cup	148	1,567.0	5	0.32	0.09	0.70
CPT	Trident	145	1,732.1	12	0.69	0.36	1.21
Standard straight stem	RM cup	138	1,613.1	12	0.74	0.38	1.30
Standard straight stem	RM Pressfit cup	137	1,164.4	1	0.09	0.00	0.48
CCA	RM Pressfit cup	135	1,311.3	7	0.53	0.21	1.10
Corail	Ultima	134	1,229.1	4	0.33	0.09	0.83
C-Stem AMT	RM Pressfit cup	130	576.0	5	0.87	0.28	2.03
Exeter	CLS Expansion	129	1,617.4	10	0.62	0.30	1.14
Exeter V40	Monoblock Acetabular Cup	123	1,660.5	5	0.30	0.10	0.70
Twin Sys cemented	Continuum TM	121	511.2	2	0.39	0.05	1.41
Accolade	Muller PE cup	114	1,254.7	9	0.72	0.33	1.36
Basis	Reflection porous	108	916.2	2	0.22	0.03	0.79
CPT	Delta-TT Cup	103	264.9	3	1.13	0.23	3.31
Twin Sys cemented	Pinnacle	100	363.0	8	2.20	0.95	4.34
MS 30	RM Pressfit cup	90	824.5	5	0.61	0.16	1.33
H-Max C	Delta-TT Cup	89	197.8	4	2.02	0.55	5.18
Exeter V40	CLS Expansion	88	1,045.0	2	0.19	0.02	0.69

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. yrs	No. revised	Rate/100	Exact 95% confidence interval	
C-Stem	Pinnacle	85	328.3	4	1.22	0.33	3.12
CPT	Tritanium	85	686.6	6	0.87	0.32	1.90
CPT	Monoblock Acetabular Cup	84	995.3	8	0.80	0.31	1.52
Exeter	Trident	84	1,330.1	1	0.08	0.00	0.42
CPT	G7 acetabular	82	159.3	6	3.77	1.20	7.76
Exeter V40	Polymax	79	132.6	0	0.00	0.00	2.78
Lateral straight stem	Continuum TM	78	538.3	3	0.56	0.08	1.49
Spectron	Fitmore	78	1,009.7	5	0.50	0.13	1.09
Spectron	Trident	78	928.5	6	0.65	0.21	1.33
Stemsys cemented	RM Pressfit cup	77	204.5	0	0.00	0.00	1.80
Lateral straight stem	Trilogy	69	591.4	13	2.20	1.17	3.76
Friendly	Delta-TT Cup	68	466.2	5	1.07	0.35	2.50
Spectron	Biomex acet shell porous	68	1,065.7	5	0.47	0.15	1.09
MS 30	Pinnacle	66	150.7	0	0.00	0.00	2.45
CPT	Pinnacle	65	561.0	2	0.36	0.04	1.29
cemented	Selexys TPS	65	505.3	6	1.19	0.44	2.58
Stemsys cemented	Delta-PF Cup	64	205.0	0	0.00	0.00	1.80
Quadra-C	Acetabular Shell	61	39.0	0	0.00	0.00	9.46
Twin Sys cemented	Reflection porous	59	230.7	0	0.00	0.00	1.60
MS 30	Duraloc	55	802.3	7	0.87	0.31	1.71
C-Stem	Duraloc	53	657.4	6	0.91	0.33	1.99

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 2019
ABG	ABGII	72	1,136.6	16	1.41	0.80	2.29	0
ABG	Duraloc	116	1,920.9	41	2.13	1.53	2.90	0
ABGII	Delta-PF Cup	107	1,358.6	11	0.81	0.38	1.40	0
ABGII	Duraloc	139	2,009.6	41	2.04	1.44	2.74	0
ABGII	Pinnacle	67	714.1	5	0.70	0.23	1.63	0
ABGII	RM Pressfit cup	89	293.5	8	2.73	1.18	5.37	8
ABGII	Trident	342	4,301.8	39	0.91	0.64	1.24	0
Accolade	Muller PE cup	114	1,254.7	9	0.72	0.33	1.36	0
Accolade	Pinnacle	180	1,752.4	3	0.17	0.04	0.50	0
Accolade	Trident	1,867	21,992.8	98	0.45	0.36	0.54	0
Accolade	Tritanium	152	1,197.3	3	0.25	0.05	0.73	0
Accolade II	Continuum TM	102	82.3	4	4.86	1.03	11.56	88
Accolade II	Delta-TT Cup	73	192.6	1	0.52	0.01	2.89	1
Accolade II	Fitmore	64	92.2	2	2.17	0.26	7.84	16

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
Accolade II	RM Pressfit cup	95	207.9	3	1.44	0.30	4.22	16
Accolade II	Trident	1,060	3,083.1	19	0.62	0.37	0.96	202
Accolade II	Tritanium	1,126	3,361.6	27	0.80	0.53	1.17	191
AML	Duraloc	53	810.6	8	0.99	0.43	1.94	0
AML MMA	Duraloc	74	1,080.4	12	1.11	0.57	1.94	0
Anthology Porous	BHR Acetabular Cup	93	766.0	51	6.66	4.96	8.75	0
Anthology Porous	R3 porous	68	517.5	33	6.38	4.39	8.96	0
Avenir Muller uncemented	Continuum TM	182	1,215.4	13	1.07	0.54	1.78	3
Avenir Muller uncemented	Fitmore	68	259.9	1	0.38	0.01	2.14	3
Avenir Muller uncemented	Pinnacle	99	890.3	3	0.34	0.05	0.90	0
Avenir Muller uncemented	RM cup	105	912.1	3	0.33	0.07	0.96	0
Avenir Muller uncemented	RM Pressfit cup	53	206.7	1	0.48	0.01	2.70	2
Avenir Muller uncemented	Tritanium	91	723.0	2	0.28	0.03	1.00	0
Basis	Reflection porous	108	916.2	2	0.22	0.03	0.79	0
CBC	Expansys shell	183	1,902.5	28	1.47	0.98	2.13	0
CBC	Fitmore	59	650.2	5	0.77	0.25	1.79	0
CBC	RM Pressfit cup	445	3,059.3	24	0.78	0.50	1.17	1
CCA	CCB	776	6,353.4	34	0.54	0.37	0.75	7
CCA	Contemporary	74	767.9	10	1.30	0.62	2.39	0
CCA	RM Pressfit cup	135	1,311.3	7	0.53	0.21	1.10	0
Charnley	Charnley	456	5,492.7	25	0.46	0.29	0.67	0
Charnley	Charnley Cup Ogee	303	3,973.1	30	0.76	0.51	1.08	0
CLS	Allofit	192	2,066.1	23	1.11	0.71	1.67	0
CLS	Artek	59	737.7	26	3.52	2.25	5.08	0
CLS	CLS Expansion	1,263	16,532.0	127	0.77	0.64	0.91	0
CLS	Continuum TM	795	3,634.8	25	0.69	0.45	1.02	76
CLS	Duraloc	699	9,516.1	103	1.08	0.88	1.31	0
CLS	Durom	198	2,069.6	66	3.19	2.47	4.06	0
CLS	Fitmore	2,339	25,582.6	127	0.50	0.41	0.59	39
CLS	Monoblock Acetabular Cup	80	911.2	5	0.55	0.15	1.20	0
CLS	Morscher	1,682	24,103.1	119	0.49	0.41	0.59	0
CLS	Pinnacle	99	697.9	3	0.43	0.09	1.26	9
CLS	Reflection porous	382	3,295.7	21	0.64	0.39	0.97	9
CLS	RM cup	113	1,245.9	17	1.36	0.76	2.14	0
CLS	RM Pressfit cup	592	4,349.9	30	0.69	0.47	0.98	25
CLS	Trabecular Metal Shell	54	459.8	3	0.65	0.13	1.91	1

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
CLS	Trident	165	1,974.9	14	0.71	0.37	1.16	0
CLS	Trilogy	654	4,767.0	31	0.65	0.44	0.92	58
CLS	Tritanium	82	439.4	3	0.68	0.14	2.00	2
CLS	Weill ring	106	1,679.6	10	0.60	0.27	1.06	0
Contemporary	Contemporary	71	922.6	12	1.30	0.67	2.27	0
Corail	ASR	156	1,263.4	84	6.65	5.30	8.23	0
Corail	Continuum TM	326	1,389.5	10	0.72	0.35	1.32	22
Corail	DeltaMotion Cup	78	596.0	1	0.17	0.00	0.93	0
Corail	Delta-PF Cup	81	959.7	3	0.31	0.06	0.91	1
Corail	Duraloc	464	5,440.9	52	0.96	0.71	1.24	0
Corail	Fitmore	307	1,172.1	11	0.94	0.44	1.62	22
Corail	Monoblock Acetabular Cup	95	1,021.4	7	0.69	0.25	1.35	0
Corail	Pinnacle	11,913	58,534.7	388	0.66	0.60	0.73	1559
Corail	Reflection porous	140	1,468.1	6	0.41	0.15	0.89	0
Corail	RM Pressfit cup	153	640.8	7	1.09	0.39	2.14	9
Corail	Trident	99	569.5	3	0.53	0.11	1.54	11
Corail	Trilogy	216	1,135.8	4	0.35	0.10	0.90	9
Corail	Tritanium	174	984.4	4	0.41	0.11	1.04	6
Corail	Ultima	135	1,238.3	4	0.32	0.09	0.83	0
CPCS	R3 porous	365	1,177.4	6	0.51	0.16	1.05	39
CPT	Continuum TM	1,548	6,258.3	54	0.86	0.65	1.13	161
CPT	Delta-TT Cup	103	264.9	3	1.13	0.23	3.31	24
CPT	Duraloc	212	2,547.0	17	0.67	0.37	1.04	0
CPT	Fitmore	195	1,207.8	12	0.99	0.51	1.74	4
CPT	G7 acetabular	82	159.3	6	3.77	1.20	7.76	24
CPT	Monoblock Acetabular Cup	84	995.3	8	0.80	0.31	1.52	0
CPT	Pinnacle	65	561.0	2	0.36	0.04	1.29	1
CPT	Trident	145	1,732.1	12	0.69	0.36	1.21	0
CPT	Trilogy	850	6,983.9	58	0.83	0.62	1.07	7
CPT	Tritanium	85	686.6	6	0.87	0.32	1.90	0
CPT	ZCA	550	5,681.9	37	0.65	0.45	0.89	5
CPT	ZCA all-poly cup	98	538.1	1	0.19	0.00	1.04	2
C-Stem	Duraloc	53	657.4	6	0.91	0.33	1.99	0
C-Stem	Elite Plus Ogee	55	560.3	2	0.36	0.04	1.29	0
C-Stem	Marathon cemented	94	388.4	0	0.00	0.00	0.95	5
C-Stem	Pinnacle	85	328.3	4	1.22	0.33	3.12	8
C-Stem AMT	Marathon cemented	355	1,990.3	13	0.65	0.33	1.09	24
C-Stem AMT	Pinnacle	2,688	10,261.7	84	0.82	0.65	1.01	348

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
C-Stem AMT	RM Pressfit cup	130	576.0	5	0.87	0.28	2.03	1
Echo Bi-Metric	Continuum TM	123	292.5	4	1.37	0.37	3.50	17
Echo Bi-Metric	Exceed ABT Ringloc-X	57	369.2	1	0.27	0.01	1.51	0
Echo Bi-Metric	G7 acetabular	541	1,133.9	8	0.71	0.30	1.39	221
Elite plus	Charnley	298	3,754.3	24	0.64	0.41	0.95	0
Elite plus	Duraloc	608	7,308.0	118	1.61	1.33	1.93	0
Elite plus	Elite Plus LPW	282	3,171.0	15	0.47	0.26	0.78	0
Elite plus	Elite Plus Ogee	110	1,105.8	6	0.54	0.20	1.18	0
Exeter	Bio-clad poly	113	1,260.3	7	0.56	0.22	1.14	0
Exeter	CLS Expansion	129	1,617.4	10	0.62	0.30	1.14	0
Exeter	Contemporary	1,551	18,676.0	187	1.00	0.86	1.16	0
Exeter	Duraloc	553	8,039.8	115	1.43	1.18	1.71	0
Exeter	Exeter	1,326	15,593.0	118	0.76	0.62	0.90	0
Exeter	Morscher	551	8,562.5	37	0.43	0.30	0.60	0
Exeter	Muller PE cup	119	1,500.6	8	0.53	0.23	1.05	0
Exeter	Osteolock	836	11,463.0	76	0.66	0.52	0.83	0
Exeter	Trident	84	1,330.1	1	0.08	0.00	0.42	0
Exeter	Trilogy	213	3,050.8	14	0.46	0.25	0.77	0
Exeter V40	Bio-clad poly	140	1,057.7	7	0.66	0.27	1.36	0
Exeter V40	CCB	577	3,417.5	14	0.41	0.22	0.69	10
Exeter V40	CLS Expansion	88	1,045.0	2	0.19	0.02	0.69	0
Exeter V40	Contemporary	6,586	53,146.2	262	0.49	0.44	0.56	82
Exeter V40	Continuum TM	2,710	12,485.5	98	0.78	0.63	0.95	171
Exeter V40	Delta-TT Cup	258	990.3	6	0.61	0.22	1.32	35
Exeter V40	Duraloc	987	11,342.7	113	1.00	0.82	1.20	0
Exeter V40	Exeter	1,639	16,100.5	91	0.57	0.45	0.69	0
Exeter V40	Exeter X3	2,453	9,344.4	44	0.47	0.34	0.63	350
Exeter V40	Fitmore	1,067	5,672.3	10	0.18	0.08	0.31	103
Exeter V40	G7 acetabular	203	351.9	4	1.14	0.24	2.91	91
Exeter V40	Monoblock Acetabular Cup	123	1,660.5	5	0.30	0.10	0.70	0
Exeter V40	Morscher	630	7,636.3	34	0.45	0.31	0.62	0
Exeter V40	Muller PE cup	94	942.8	3	0.32	0.07	0.93	0
Exeter V40	Osteolock	270	3,331.2	15	0.45	0.24	0.72	0
Exeter V40	Pinnacle	2,811	13,960.7	65	0.47	0.36	0.59	359
Exeter V40	Polymax	79	132.6	0	0.00	0.00	2.78	16
Exeter V40	R3 porous	675	2,742.5	18	0.66	0.39	1.04	69
Exeter V40	Reflection cemented	960	6,253.7	23	0.37	0.23	0.54	34
Exeter V40	Reflection porous	476	4,419.5	14	0.32	0.17	0.53	1
Exeter V40	RM Pressfit cup	2,647	13,125.0	47	0.36	0.26	0.48	261

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
Exeter V40	Trabecular Metal Shell	222	1,220.7	14	1.15	0.60	1.87	10
Exeter V40	Trident	11,414	72,796.6	318	0.44	0.39	0.49	1024
Exeter V40	Trident II Tritanium	202	106.5	2	1.88	0.10	6.78	174
Exeter V40	Trilogy	2,944	21,899.0	86	0.39	0.31	0.48	139
Exeter V40	Tritanium	3,429	14,122.7	87	0.62	0.49	0.76	308
Exeter V40	Weber	53	587.8	1	0.17	0.00	0.95	0
Exeter V40	ZCA	98	620.5	1	0.16	0.00	0.90	5
Exeter V40	ZCA all-poly cup	109	499.7	0	0.00	0.00	0.74	5
Friendly	Delta-PF Cup	169	1,854.1	5	0.27	0.09	0.63	1
Friendly	Delta-TT Cup	68	466.2	5	1.07	0.35	2.50	1
Furlong	Furlong	66	840.8	7	0.83	0.33	1.72	0
H-Max C	Delta-TT Cup	89	197.8	4	2.02	0.55	5.18	28
H-Max M	Delta-PF Cup	71	587.1	7	1.19	0.43	2.34	0
H-Max M	Delta-TT Cup	86	727.2	4	0.55	0.15	1.41	0
H-Max S	Delta-PF Cup	225	790.3	8	1.01	0.44	1.99	31
H-Max S	Delta-TT Cup	826	3,651.6	29	0.79	0.52	1.12	89
H-Max S	Trident	55	110.2	1	0.91	0.02	5.06	11
Lateral straight stem	Continuum TM	78	538.3	3	0.56	0.08	1.49	0
Lateral straight stem	Muller PE cup	752	7,354.9	40	0.54	0.39	0.74	2
Lateral straight stem	RM cup	533	5,547.2	43	0.78	0.56	1.04	0
Lateral straight stem	RM Pressfit cup	173	1,364.8	3	0.22	0.05	0.64	0
Lateral straight stem	Trilogy	69	591.4	13	2.20	1.17	3.76	0
Lateral straight stem	Weber	287	2,963.1	11	0.37	0.19	0.66	0
Lateral straight stem	ZCA	98	805.8	1	0.12	0.00	0.69	0
Lateral straight stem	ZCA all-poly cup	70	478.4	0	0.00	0.00	0.77	0
M/L Taper	Continuum TM	10,43	5,097.6	40	0.78	0.55	1.06	39
M/L Taper	Delta-TT Cup	64	378.3	5	1.32	0.43	3.08	0
M/L Taper	Trident	304	1,015.7	6	0.59	0.19	1.22	55
M/L Taper	Trilogy	215	2,040.0	9	0.44	0.19	0.81	0
Mallory-Head	M2A	105	1,315.2	16	1.22	0.67	1.98	0
MasterSL	Delta-TT Cup	90	126.2	3	2.38	0.49	6.94	31
MS 30	Contemporary	128	1,266.8	11	0.87	0.41	1.50	0
MS 30	Continuum TM	437	1,981.5	7	0.35	0.14	0.73	33
MS 30	Duraloc	55	802.3	7	0.87	0.31	1.71	0
MS 30	Fitmore	2,357	16,029.6	44	0.27	0.20	0.37	182

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
MS 30	Morscher	787	10,146.6	65	0.64	0.49	0.82	0
MS 30	Muller PE cup	462	4,510.5	15	0.33	0.19	0.55	0
MS 30	Pinnacle	66	150.7	0	0.00	0.00	2.45	34
MS 30	RM Pressfit cup	90	824.5	5	0.61	0.16	1.33	0
MS 30	Trilogy	360	2,230.5	6	0.27	0.10	0.59	29
MS 30	ZCA all-poly cup	94	574.7	1	0.17	0.00	0.97	0
Omnifit	Trident	149	1,922.3	13	0.68	0.34	1.12	0
Optimys	RM Pressfit cup	195	286.5	3	1.05	0.22	3.06	88
Polarstem uncemented	R3 porous	1,743	6,125.2	36	0.59	0.41	0.81	224
Polarstem uncemented	Reflection porous	335	2,342.5	14	0.60	0.33	1.00	0
Polarstem uncemented	RM Pressfit cup	67	46.5	1	2.15	0.05	11.97	47
Prodigy	Duraloc	113	1,522.8	24	1.58	1.01	2.34	0
Quadra-C	Acetabular Shell	62	39.4	0	0.00	0.00	9.37	47
Quadra-H	Acetabular Shell	84	41.1	2	4.86	0.59	17.57	73
SL modular stem	Muller PE cup	83	1,126.1	2	0.18	0.02	0.64	0
SL modular stem	RM cup	322	4,737.1	42	0.89	0.64	1.20	0
SL monoblock	Muller PE cup	488	5,579.9	25	0.45	0.29	0.66	0
Spectron	Biomex acet shell porous	68	1,065.7	5	0.47	0.15	1.09	0
Spectron	Duraloc	1,151	14,173.7	186	1.31	1.13	1.51	0
Spectron	Fitmore	78	1,009.7	5	0.50	0.13	1.09	0
Spectron	Mallory-Head	152	1,885.1	8	0.42	0.18	0.84	0
Spectron	Morscher	210	2,864.0	32	1.12	0.76	1.58	0
Spectron	Muller PE cup	66	669.7	8	1.19	0.52	2.35	0
Spectron	R3 porous	441	2,795.0	10	0.36	0.17	0.66	8
Spectron	Reflection cemented	2,957	30,411.4	364	1.20	1.08	1.33	0
Spectron	Reflection porous	2,755	29,101.1	246	0.85	0.74	0.96	0
Spectron	Trident	78	928.5	6	0.65	0.21	1.33	0
S-Rom	ASR	130	834.9	95	11.38	9.15	13.84	0
S-Rom	Pinnacle	381	3,956.7	39	0.99	0.70	1.35	6
S-Rom	Ultima	78	1,311.7	14	1.07	0.58	1.79	0
Standard straight stem	Muller PE cup	632	5,953.6	22	0.37	0.22	0.55	3
Standard straight stem	RM cup	138	1,613.1	12	0.74	0.38	1.30	0
Standard straight stem	RM Pressfit cup	137	1,164.4	1	0.09	0.00	0.48	0
Standard straight stem	Weber	134	1,332.9	4	0.30	0.08	0.77	0
Standard straight stem	ZCA all-poly cup	50	328.1	1	0.30	0.00	1.70	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
Stemsys	Agilis Ti-por	514	1,956.2	18	0.92	0.55	1.45	75
Stemsys	DeltaMotion Cup	526	2,909.6	8	0.27	0.12	0.54	40
Stemsys	Delta-PF Cup	464	1,500.7	7	0.47	0.19	0.96	68
Stemsys	Fixa Ti Por	836	3,435.6	21	0.61	0.38	0.93	129
Stemsys	Polymax	146	380.8	4	1.05	0.29	2.69	27
Stemsys	RM Pressfit cup	355	1,485.2	6	0.40	0.13	0.83	30
Stemsys cemented	Delta-PF Cup	64	205.0	0	0.00	0.00	1.80	15
Stemsys cemented	RM Pressfit cup	77	204.5	0	0.00	0.00	1.80	13
Summit	ASR	88	786.5	37	4.70	3.31	6.48	0
Summit	Duraloc	101	1,291.6	5	0.39	0.13	0.90	0
Summit	Pinnacle	2,413	15,539.1	111	0.71	0.59	0.86	164
Summit	Trilogy	178	1,433.0	7	0.49	0.20	1.01	10
Synergy Porous	BHR Acetabular Cup	114	1,097.8	41	3.73	2.64	5.01	0
Synergy Porous	Continuum TM	55	175.5	0	0.00	0.00	2.10	0
Synergy Porous	Delta-PF Cup	96	865.6	2	0.23	0.03	0.83	8
Synergy Porous	R3 porous	1,829	9,568.5	62	0.65	0.49	0.82	50
Synergy Porous	Reflection porous	1,238	12,932.7	45	0.35	0.25	0.47	0
Taperloc Complete	Continuum TM	180	240.2	3	1.25	0.26	3.65	72
Taperloc Complete	Delta-TT Cup	77	108.2	0	0.00	0.00	3.41	33
Taperloc Complete	G7 acetabular	324	668.3	8	1.20	0.47	2.26	62
Taperloc Complete	RM Pressfit cup	261	469.6	6	1.28	0.41	2.63	93
Trabecular Metal Stem	Continuum TM	472	2,573.3	18	0.70	0.41	1.11	25
Trabecular Metal Stem	Monoblock Acetabular Cup	74	890.9	3	0.34	0.05	0.90	0
Tri-Lock BPS	Pinnacle	64	480.6	3	0.62	0.09	1.67	1
Twin Sys cemented	CCB	449	2,572.0	19	0.74	0.43	1.13	8
Twin Sys cemented	Continuum TM	121	511.2	2	0.39	0.05	1.41	13
Twin Sys cemented	Pinnacle	100	363.0	8	2.20	0.95	4.34	24
Twin Sys cemented	Reflection porous	59	230.7	0	0.00	0.00	1.60	0
Twin Sys cemented	RM cup	148	1,567.0	5	0.32	0.09	0.70	0
Twin Sys cemented	RM Pressfit cup	2,045	10,149.1	48	0.47	0.35	0.63	181
Twin Sys cemented	Selexys TPS	65	505.3	6	1.19	0.44	2.58	0
Twin Sys uncemented	Continuum TM	135	941.4	5	0.53	0.17	1.24	2
Twin Sys uncemented	Delta-PF Cup	370	3,351.9	3	0.09	0.01	0.24	0
Twin Sys uncemented	RM cup	122	1,133.1	9	0.79	0.36	1.51	0
Twin Sys uncemented	RM Pressfit cup	5,054	33,283.1	213	0.64	0.56	0.73	199
Twin Sys uncemented	Selexys TPS	1,231	11,422.3	142	1.24	1.04	1.46	0

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number revised	Rate/100 component-years	Exact 95% confidence interval		Procedures 2019
Twin Sys uncemented	Trilogy	209	1,983.7	12	0.60	0.29	1.02	0
Versys	Trilogy	272	4,077.0	18	0.44	0.25	0.68	0
Versys cemented	Trilogy	237	2,723.2	8	0.29	0.11	0.58	0
Versys cemented	ZCA	391	4,349.0	30	0.69	0.47	0.98	0
Wagner cone stem	Continuum TM	51	188.3	2	1.06	0.06	3.41	6
Wagner cone stem	Fitmore	76	868.7	4	0.46	0.13	1.18	3

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	793	8,678.6	60	0.69	0.53	0.89
<=28	CM	77	295.3	5	1.69	0.46	3.71
<=28	CP	12,229	119,905.9	820	0.68	0.64	0.73
<=28	MM	3,232	43,632.1	331	0.76	0.68	0.84
<=28	MP	46,905	463,127.4	3,314	0.72	0.69	0.74
32	CC	3,942	34,039.8	178	0.52	0.45	0.60
32	CP	16,832	68,335.0	386	0.56	0.51	0.62
32	MM	480	5,205.2	48	0.92	0.68	1.22
32	MP	32,057	160,811.1	937	0.58	0.55	0.62
36	CC	7,763	53,353.5	295	0.55	0.49	0.62
36	CM	441	4,023.6	27	0.67	0.44	0.98
36	CP	8,182	29,758.8	193	0.65	0.56	0.75
36	MM	1,004	11,174.7	142	1.27	1.07	1.49
36	MP	4,545	18,759.7	136	0.72	0.61	0.85
>36	CC	2,003	10,560.4	57	0.54	0.41	0.70
>36	CM	7	69.5	0	0.00	0.00	5.30
>36	CP	24	33.9	1	2.95	0.00	16.44
>36	MM	1,648	15,744.4	569	3.61	3.32	3.92
>36	MP	34	201.3	1	0.50	0.00	2.77

Summary Revision Rates vs Head Size

Size	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% Confidence Interval	
<=28	63,236	635,639.3	4,530	0.71	0.69	0.73
32	53,311	268,391.1	1,549	0.58	0.55	0.61
36	21,935	117,070.2	793	0.68	0.63	0.73
>36	3,716	26,609.6	628	2.36	2.18	2.55

Revision Comparison Standard vs Cross linked Polyethylene

Surfaces	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% Confidence Interval	
CC	14,532	106,689.2	590	0.55	0.51	0.60
CM	528	4,395.3	32	0.73	0.50	1.03
CP	37,456	218,292.1	1,406	0.64	0.61	0.68
PS	7,164	85,513.3	667	0.78	0.72	0.84
PX	30,292	132,778.7	739	0.56	0.52	0.60
MM	6,370	75,784.3	1,092	1.44	1.36	1.53
MP	83,614	643,141.7	4,388	0.68	0.66	0.70
PS	37,201	369,929.9	2,868	0.78	0.75	0.80
PX	46,413	273,211.8	1,520	0.56	0.53	0.58

Revision vs Bearing Surfaces of Uncemented Prostheses

Surfaces	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% confidence Interval	
CC	11,356	84,596.0	487	0.58	0.53	0.63
CM	489	4,290.1	30	0.70	0.46	0.98
CP	24,726	139,747.7	907	0.65	0.61	0.69
MM	5,401	66,051.5	988	1.50	1.40	1.59
MP	16,748	119,094.2	898	0.75	0.71	0.80

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	828	6,580.0	51	0.78	0.57	1.01
MM	46	403.8	3	0.74	0.15	2.17
MP	25,508	220,038.1	1,453	0.66	0.63	0.70

Revision vs Bearing Surfaces of Hybrid Prostheses

Surfaces	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% Confidence Interval	
CC	3,176	22,093.2	103	0.47	0.38	0.57
CM	39	105.2	2	1.90	0.23	6.87
CP	11,902	71,964.3	448	0.62	0.57	0.68
MM	923	9,329.0	101	1.08	0.88	1.31
MP	41,358	304,009.4	2,037	0.67	0.64	0.70

Summary for Revision vs Bearing Surfaces

Surfaces	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component-years	Exact 95% Confidence Interval	
CC	14,532	106,689.2	590	0.55	0.51	0.60
CM	528	4,395.3	32	0.73	0.50	1.03
CP	37,456	218,292.1	1,406	0.64	0.61	0.68
MM	6,370	75,784.3	1,092	1.44	1.36	1.53
MP	83,614	643,141.7	4,388	0.68	0.66	0.70

Revision vs Bearing Surface Options for 6 Acetabulae in common use

		No. Ops	Observed comp. yrs	No. revised	Rate/100 Component years	Exact 95% confidence interval	
RM Pressfit cup	MM	333	3,521.2	29	0.82	0.55	1.18
	PS	6,203	46,194.5	266	0.58	0.51	0.65
	PX	6,432	24,507.8	129	0.53	0.44	0.63
	P	12,635	70,702.3	395	0.56	0.50	0.62
Pinnacle	CC	3,387	22,420.1	117	0.52	0.43	0.63
	MM	1,061	12,125.2	155	1.28	1.09	1.50
	PS	24	164.3	3	1.83	0.38	5.34
	PX	16,173	70,092.6	425	0.61	0.55	0.67
	P	16,197	70,256.9	428	0.61	0.55	0.67
R3 porous	CC	998	6,042.4	20	0.33	0.20	0.51
	MM	110	870.3	51	5.86	4.36	7.70
	P	4,088	16,592.3	99	0.60	0.48	0.73
Trident	CC	2,524	26,921.5	119	0.44	0.37	0.53
	MM	122	276.7	4	1.45	0.39	3.70
	PS	1	13.9	0	0.00	0.00	26.52
	PX	13,436	86,284.0	443	0.51	0.47	0.56
	P	13,437	86,297.9	443	0.51	0.47	0.56
Tritanium	CC	108	643.3	1	0.16	0.00	0.87
	MM	143	429.7	5	1.16	0.38	2.72
	P	5,128	21,510.9	138	0.64	0.54	0.76
Trilogy	CC	69	940.5	5	0.53	0.17	1.24
	MM	5	60.8	0	0.00	0.00	6.07
	PS	158	2,343.5	14	0.60	0.33	1.00
	PX	6,347	50,866.3	267	0.52	0.46	0.59
	P	6,505	53,209.8	281	0.53	0.47	0.59

Revision vs Monoblock Femoral Stems

No. Ops	Observed comp. years	Number revised	Rate/100 Component years	Exact 95% confidence interval	
1,297	15,566	84	0.54	0.43	0.67

Revision vs Acetabulum type

Acetabulum type	No. Ops.	Observed comp. yrs	Number Revised	Rate/100-component years	Exact 95% Confidence Interval	
Cemented Liner	63	144.0	1	0.69	0.02	3.87
Cemented No Liner	26,973	232,371.5	1,559	0.67	0.64	0.71
Uncemented Liner	93,388	639,519.8	4,489	0.70	0.68	0.72
Uncemented No Liner	22,076	176,267.2	1,459	0.83	0.79	0.87

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% Confidence Interval	
<40	2,279	21,009.7	218	1.04	0.90	1.18
40-54	18,529	158,228.2	1,637	1.03	0.99	1.09
55-64	36,351	293,393.9	2,431	0.83	0.80	0.86
65-74	48,784	365,644.9	2,264	0.62	0.59	0.65
>=75	38,843	236,277.7	1,115	0.47	0.44	0.50

Revision for 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	<40	792	5,602.5	39	0.70	0.50	0.95
	40-54	4,849	36,087.3	228	0.63	0.55	0.72
	55-64	5,860	44,183.4	206	0.47	0.40	0.53
	65-74	2,750	19,198.5	108	0.56	0.46	0.68
	>=75	281	1,617.5	9	0.56	0.25	1.06
CM	<40	15	124.4	2	1.61	0.19	5.81
	40-54	178	1,556.8	10	0.64	0.31	1.18
	55-64	221	1,901.4	15	0.79	0.44	1.30
	65-74	91	687.9	5	0.73	0.24	1.70
	>=75	23	124.8	0	0.00	0.00	2.96
CP	<40	619	4,573.7	54	1.18	0.89	1.54
	40-54	6,264	41,266.9	350	0.85	0.76	0.94
	55-64	13,052	79,755.6	509	0.64	0.58	0.70
	65-74	12,556	70,061.8	366	0.52	0.47	0.58
	>=75	4,965	22,634.2	127	0.56	0.47	0.67
MM	<40	427	6,031.2	71	1.18	0.92	1.48
	40-54	2,474	31,841.4	458	1.44	1.31	1.58
	55-64	2,405	28,480.5	457	1.60	1.46	1.76
	65-74	763	7,688.0	89	1.16	0.93	1.42
	>=75	301	1,743.3	17	0.98	0.57	1.56

Bearing Surface	Age Bands	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% Confidence Interval	
MP	<40	406	4,374.5	48	1.10	0.81	1.45
	40-54	4,533	44,279.0	558	1.26	1.16	1.37
	55-64	14,354	133,021.7	1,201	0.90	0.85	0.96
	65-74	31,757	257,617.1	1,638	0.64	0.61	0.67
	>=75	32,564	203,849.5	943	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	77,495	573,069.1	3,689	0.64	0.62	0.66
M	67,291	501,485.3	3,976	0.79	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	1,870	15,130.7	152	1.00	0.85	1.18
10-24	14,773	115,270.9	868	0.75	0.70	0.80
25-49	58,889	440,063.1	3,348	0.76	0.74	0.79
50-74	34,636	249,098.9	1,598	0.64	0.61	0.67
75-99	15,085	88,882.4	545	0.61	0.56	0.67
>=100	19,533	166,108.5	1,154	0.69	0.65	0.74

Revision vs Approach

Approach	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% confidence interval	
Anterior	4,773	41,830.5	321	0.77	0.69	0.86
Posterior	96,198	689,324.8	4,978	0.72	0.70	0.74
Lateral	34,115	278,244.4	1,838	0.66	0.63	0.69
Troch	218	1,812.8	23	1.27	0.80	1.90

Revision vs Arthroplasty Fixation

Fixation	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% confidence interval	
Cemented	27,803	243,657.9	1,602	0.66	0.63	0.69
Uncemented	59,207	418,441.6	3,341	0.80	0.77	0.83
Hybrid	57,776	412,454.9	2,722	0.66	0.64	0.69

Revision for Arthroplasty Fixation vs Age Bands

Age Bands	No. of Ops.	Observed comp. yrs	Number Revised	Rate/100 Component years	Exact 95% confidence interval	
Cemented						
<40	72	760.3	10	1.32	0.63	2.42
40-54	700	7,375.9	149	2.02	1.71	2.37
55-64	2,660	29,853.3	355	1.19	1.07	1.32
65-74	9,461	97,230.4	677	0.70	0.64	0.75
>=75	14,910	108,438.0	411	0.38	0.34	0.42
Uncemented						
<40	1,799	16,021.8	163	1.02	0.87	1.19
40-54	13,769	112,924.6	1,032	0.91	0.86	0.97
55-64	21,427	157,031.4	1,269	0.81	0.76	0.85
65-74	16,120	101,268.5	654	0.65	0.60	0.70
>=75	6,092	31,195.4	223	0.71	0.62	0.82
Hybrid						
<40	408	4,227.6	45	1.06	0.78	1.42
40-54	4,060	37,927.7	456	1.20	1.09	1.32
55-64	12,264	106,509.3	807	0.76	0.71	0.81
65-74	23,203	167,146.0	933	0.56	0.52	0.60
>=75	17,841	96,644.3	481	0.50	0.45	0.54

Revision vs ASA Status

ASA Class	No. Ops.	Observed comp. years	Number revised	Rate/100 Component years	Exact 95% confidence interval	
1	17,432	116,836.4	807	0.69	0.64	0.74
2	65,912	394,485.6	2,452	0.62	0.60	0.65
3	26,606	134,794.3	947	0.70	0.66	0.75
4	980	3,408.8	37	1.09	0.76	1.50

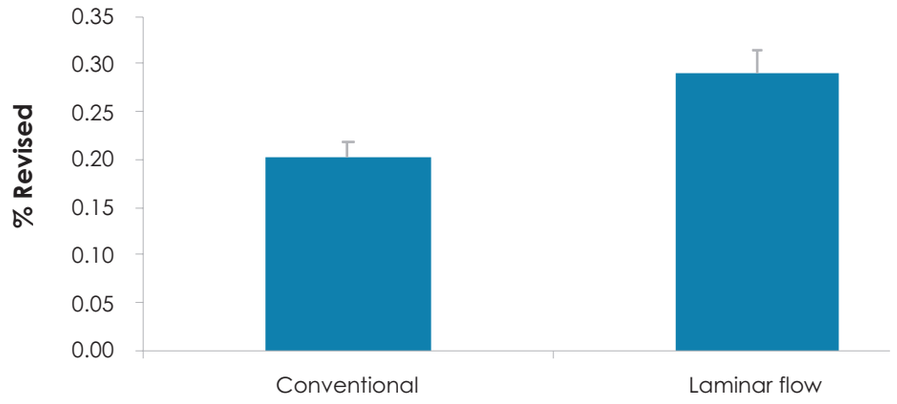
Revision vs BMI Status

BMI	No. Ops.	Observed comp. years	Number Revised	Rate/100 component years	Exact 95% Confidence Interval	
< 19	594	2,132.1	18	0.84	0.50	1.33
19 - 24	11,757	47,318.7	255	0.54	0.47	0.61
25 - 29	21,516	86,748.1	487	0.56	0.51	0.61
30 - 39	20,580	80,404.2	536	0.67	0.61	0.73
40+	2,276	8,247.3	99	1.20	0.98	1.46

Revision for Deep Infection within six months vs Theatre Environment

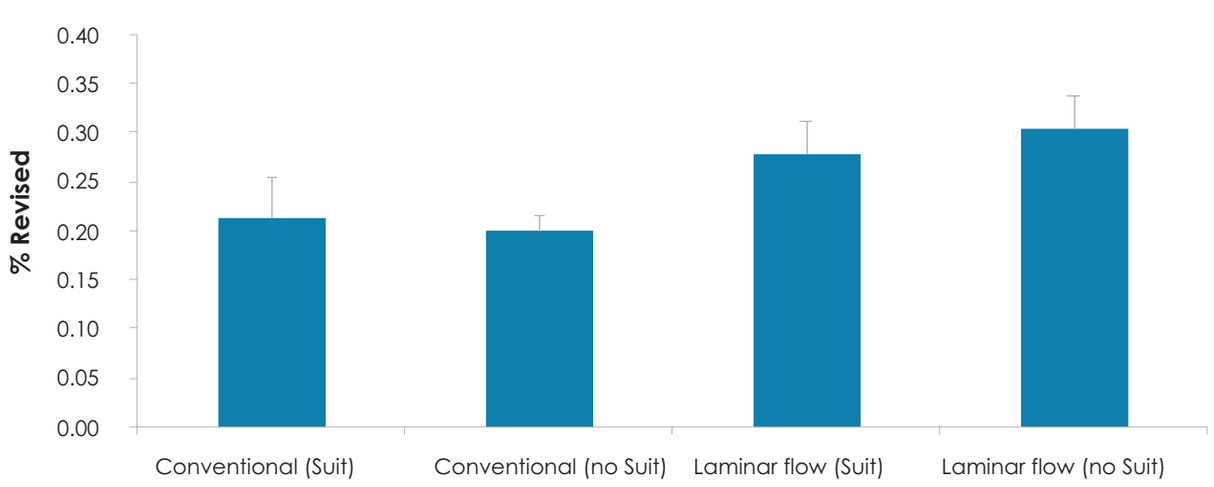
Theatre	Total number	Number Revised	%	Standard error
Conventional	84,708	171	0.202	0.0154
Laminar flow	51,918	151	0.291	0.0236

% Revision for Deep infection within 6 months

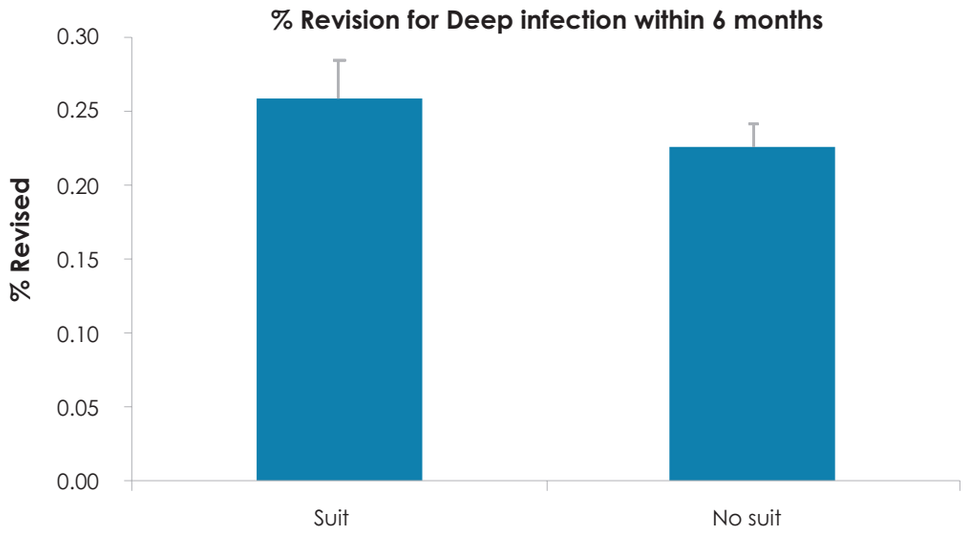


		Total number	Number revised	%	Standard error
Conventional	Suit	11,738	25	0.213	0.043
	no Suit	72,970	146	0.200	0.017
Laminar flow	Suit	26,912	75	0.279	0.032
	no Suit	25,006	76	0.304	0.035

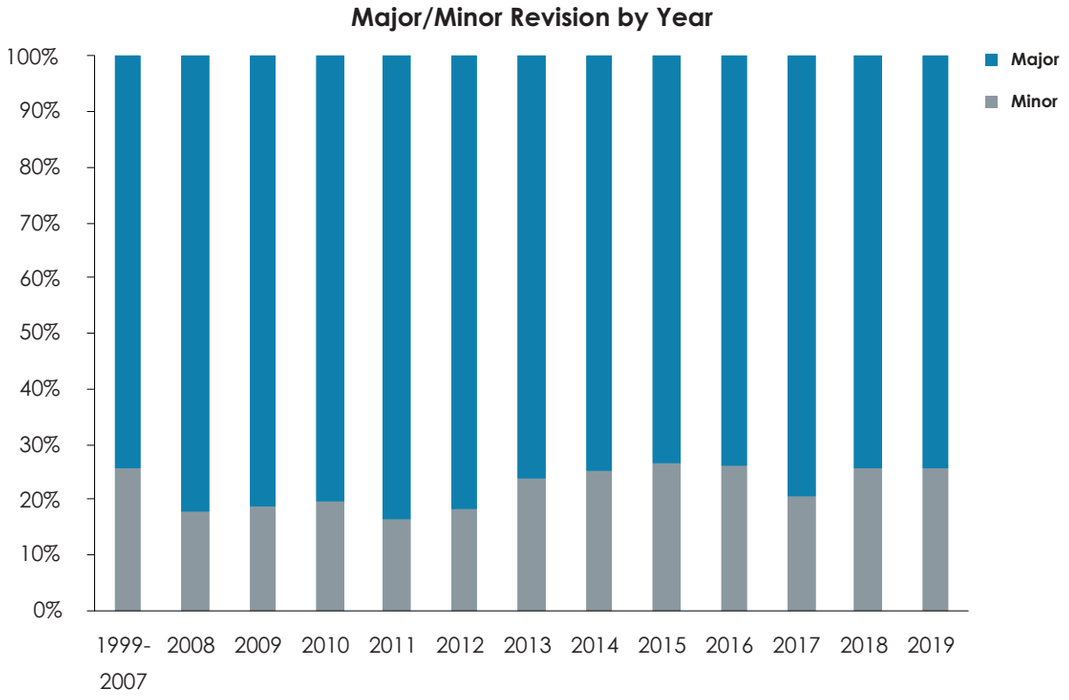
% Revision for Deep infection within 6 months



	Total number	Number revised	%	Standard error
Suit	38,650	100	0.26	0.026
No Suit	97,976	222	0.23	0.015



Comparison of Major vs Minor Revisions by Year

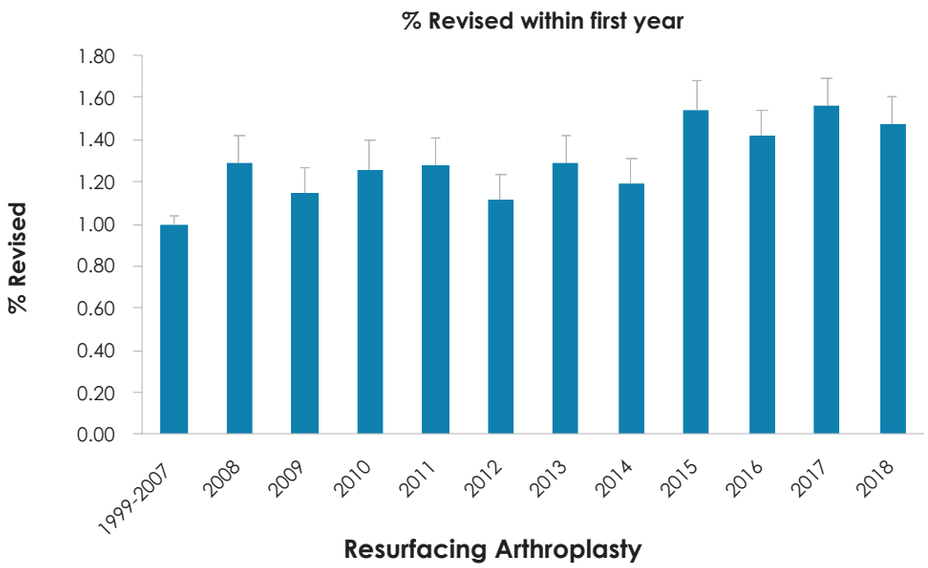


A major revision is defined as revision of acetabulum and/or femur including any of minor components and minor revision as change of head and/or liner only.

Re-revisions for Major vs Minor revisions

	No. Ops.	Observed comp. years	Number Re-revised	Rate/100 component years	Exact 95% confidence interval	
Minor	1,757	8,643.7	318	3.68	3.29	4.11
Major	5,867	30,003.3	818	2.73	2.54	2.92

Percentage of hips revised in the first year



Resurfacing Arthroplasty

No. Ops.	Observed component years	Number revised	Rate/100 component years	Exact 95% Confidence Interval	
2,001	15,886.4	161	1.01	0.86	1.18

Resurfacing Prosthesis vs Revision Rate

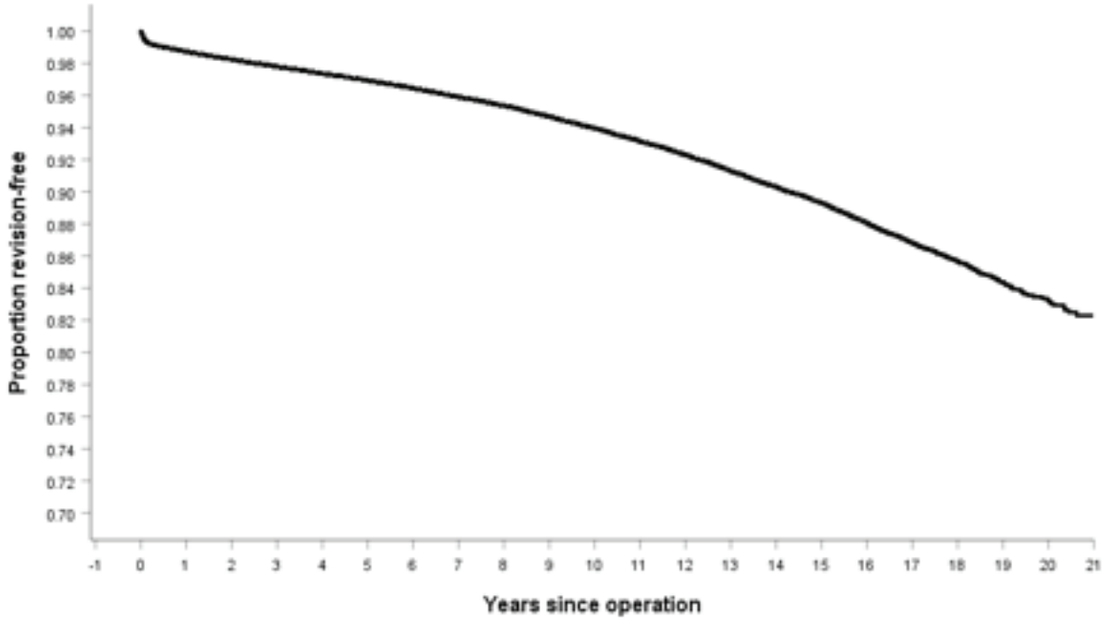
Prosthesis	No. Ops.	Observed comp. years	Number Revised	Rate/100 component years	Exact 95% Confidence Interval	
Adept	4	47.1	0	0.00	0.00	7.83
ASR	132	1,426.0	43	3.02	2.18	4.06
BHR	1,818	13,993.4	110	0.79	0.64	0.94
BMHR	28	242.2	2	0.83	0.10	2.98
Conserve Superfinish	3	31.6	0	0.00	0.00	11.68
Durom	4	59.5	0	0.00	0.00	6.20
Mitch TRH Resurfacing Head	12	86.6	6	6.93	2.20	14.28

Head size vs Revision Rate

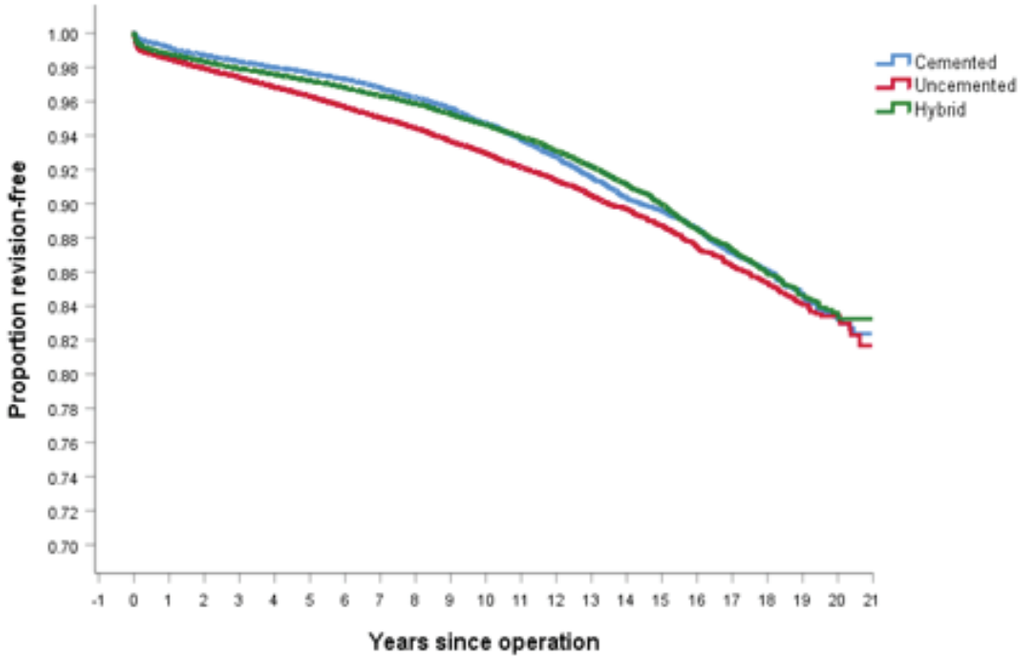
Head size	No. Ops.	Observed comp. yrs	Number Revised	Rate/100 component years	Exact 95% Confidence Interval	
<=44	99	900.6	33	3.66	2.52	5.15
45-49	367	3,298.3	52	1.58	1.16	2.05
50-54	1,439	10,734.5	66	0.61	0.48	0.78
>=55	96	952.9	10	1.05	0.47	1.86

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 21 years 1999 – 2019 with deceased patients censored at time of death.



Years	% Revision-free	No. in each year
1	98.73	131,665
2	98.25	120,360
3	97.79	109,053
4	97.36	98,268
5	96.93	87,886
6	96.45	77,805
7	95.90	68,560
8	95.35	59,728
9	94.69	51,644
10	93.95	43,835
11	93.14	36,805
12	92.30	30,454
13	91.31	24,678
14	90.32	19,676
15	89.32	15,152
16	88.06	11,118
17	86.80	7,888
18	85.67	5,299
19	84.36	3,074



Cemented

Years	% Revision-free	No. in each year
1	99.16	25,988
2	98.71	24,552
3	98.34	23,090
4	97.99	21,443
5	97.66	19,673
6	97.31	17,831
7	96.79	16,059
8	96.21	14,222
9	95.62	12,576
10	94.71	11,032
11	93.76	9,615
12	92.75	8,201
13	91.54	6,827
14	90.38	5,587
15	89.59	4,407
16	88.54	3,328
17	87.11	2,428
18	86.10	1,693
19	84.73	1,011

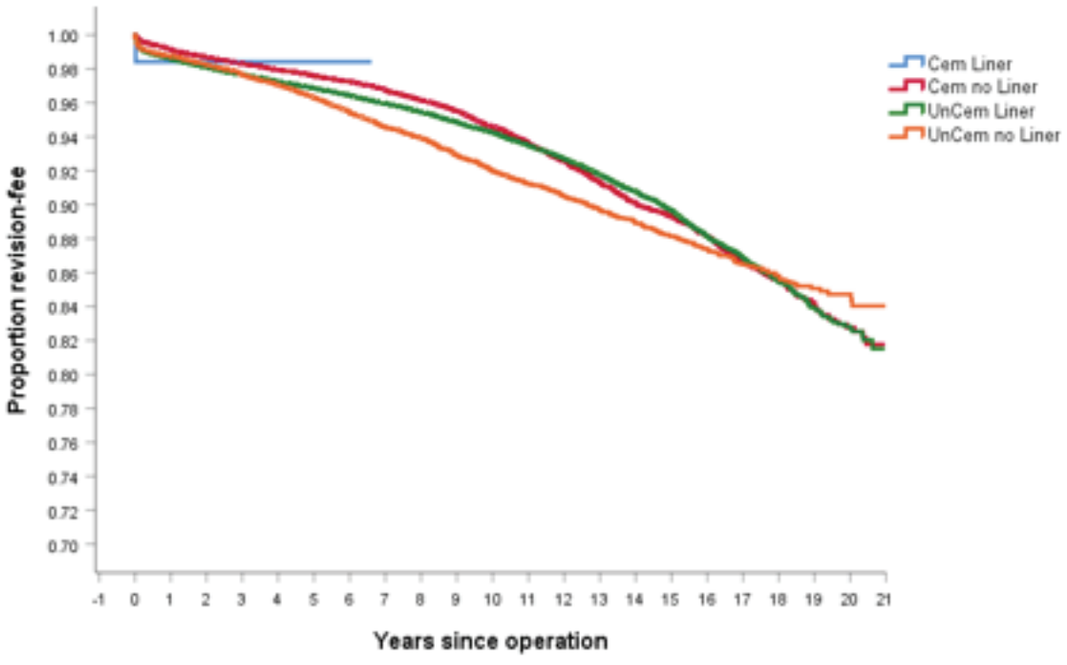
Uncemented

Years	% Revision-free	No. in each year
1	98.49	53,454
2	97.94	48,545
3	97.40	43,648
4	96.83	39,165
5	96.30	34,912
6	95.67	30,829
7	95.04	27,040
8	94.43	23,492
9	93.67	20,086
10	92.94	16,508
11	92.14	13,268
12	91.36	10,568
13	90.46	8,300
14	89.71	6,393
15	88.71	4,843
16	87.48	3,506
17	86.35	2,441
18	85.36	1,611
19	84.08	932

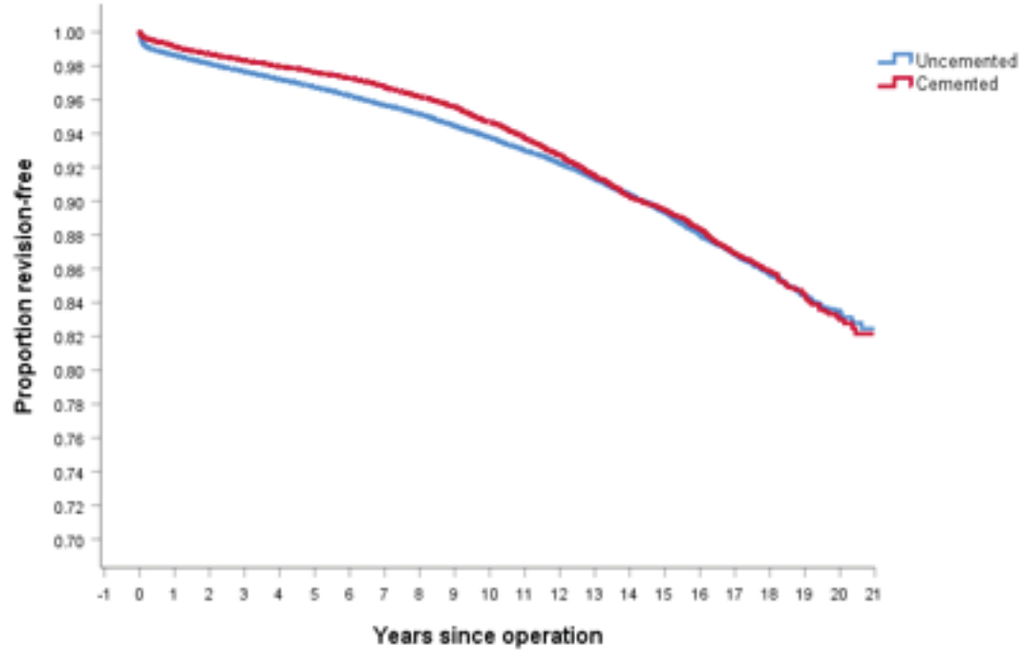
Hybrid

Years	% Revision-free	No. in each year
1	98.78	52,223
2	98.34	47,263
3	97.92	42,315
4	97.60	37,660
5	97.21	33,301
6	96.81	29,145
7	96.33	25,461
8	95.87	22,014
9	95.28	18,982
10	94.62	16,295
11	93.90	13,922
12	93.11	11,685
13	92.18	9,551
14	91.13	7,696
15	89.96	5,902
16	88.52	4,284
17	87.26	3,019
18	85.92	1,995
19	84.65	1,131

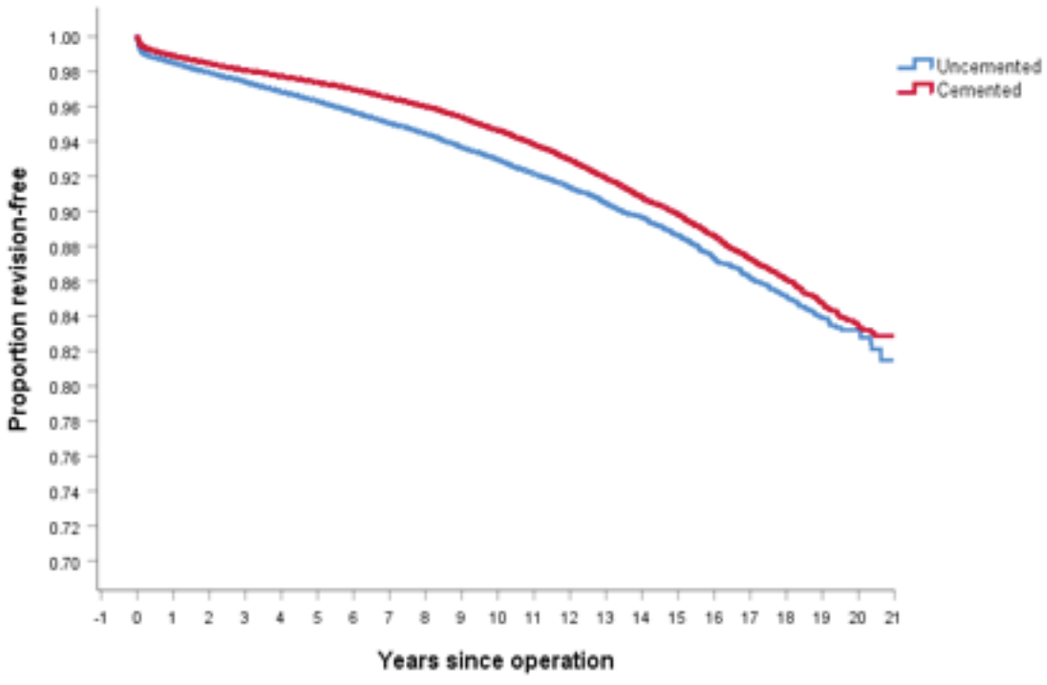
Survival of Cemented vs Uncemented no Liner vs Uncemented with Liner



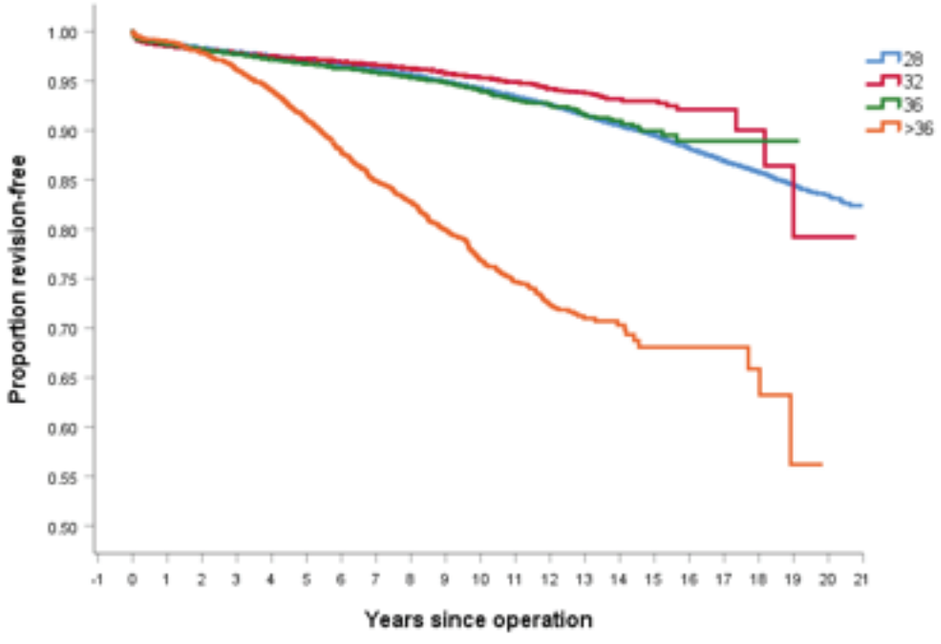
Survival of Cemented vs Uncemented Acetabulae



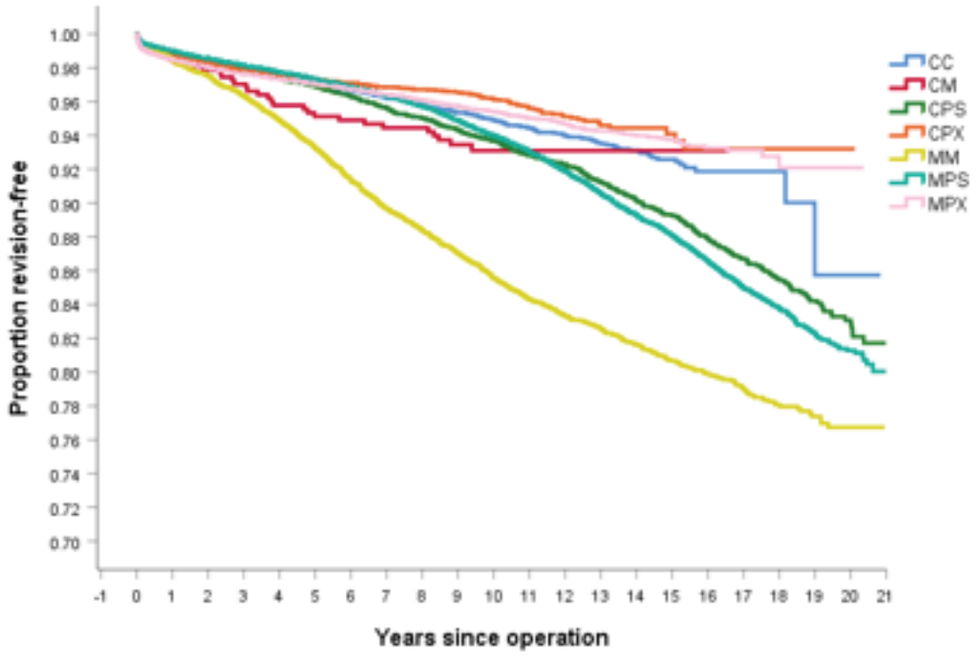
Survival of Cemented vs Uncemented Femoral components



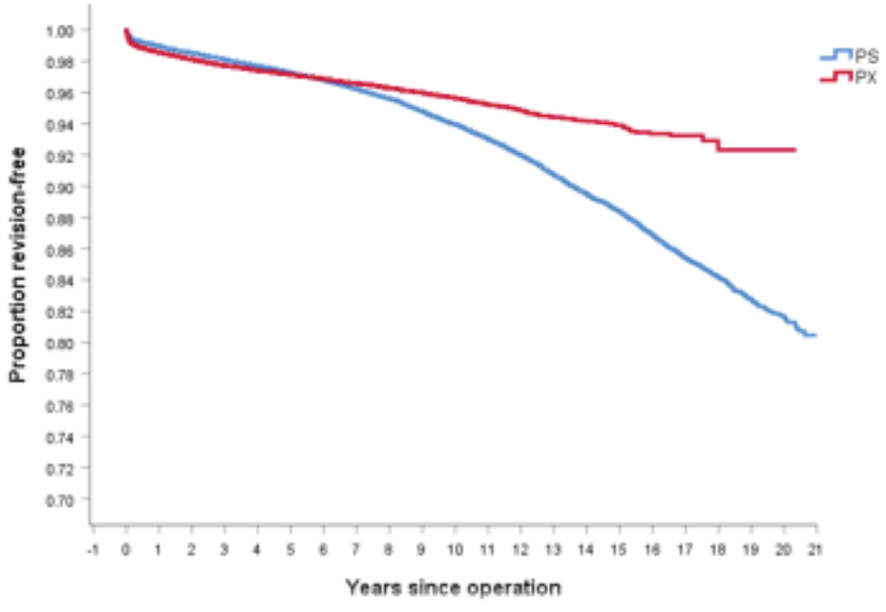
Survival of Head Sizes



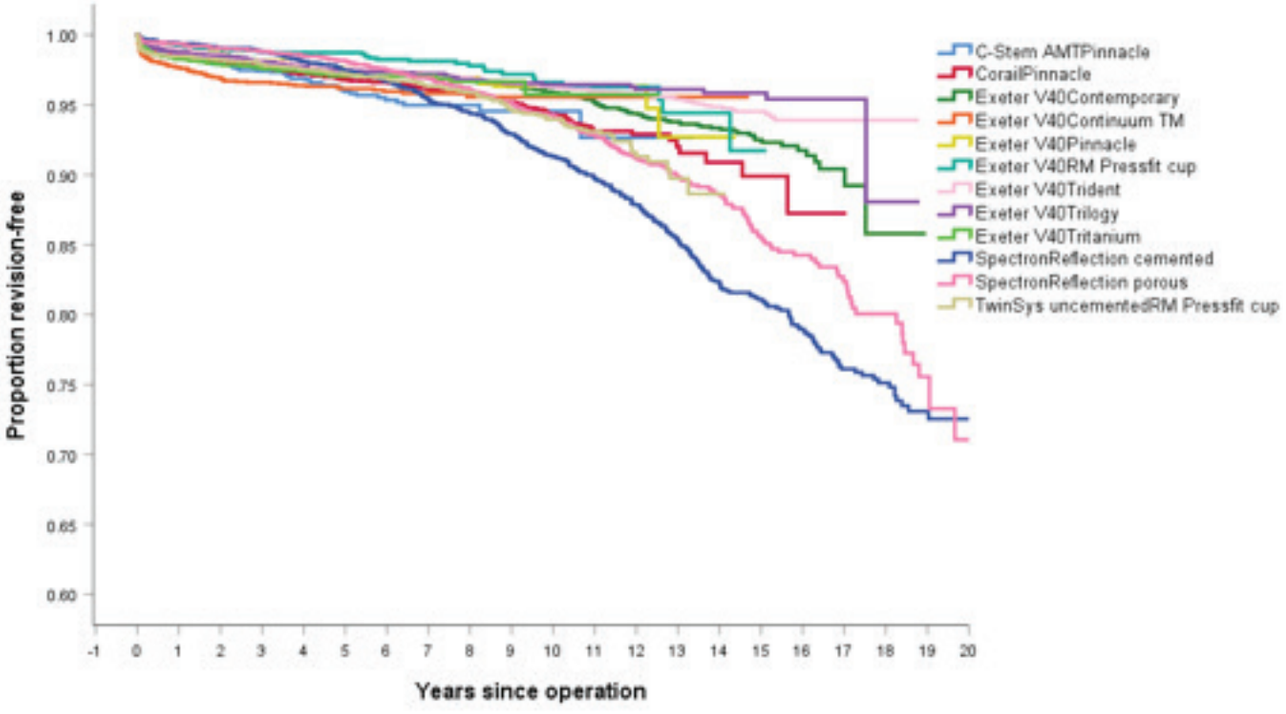
Survival of Bearing Surfaces



Survival of Crosslinked vs Standard polyethylene

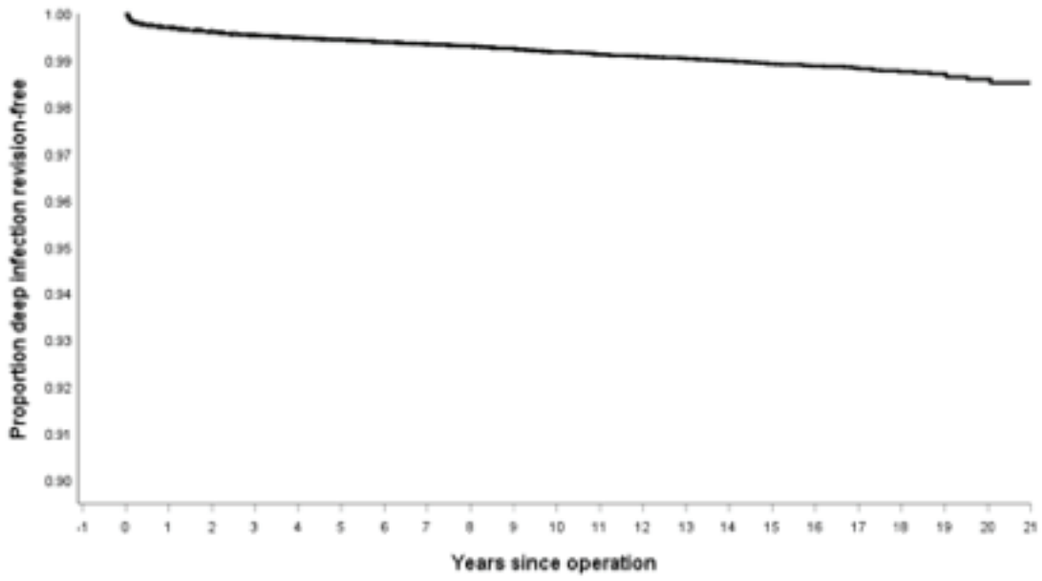


Survival of combinations with > 2500 procedures

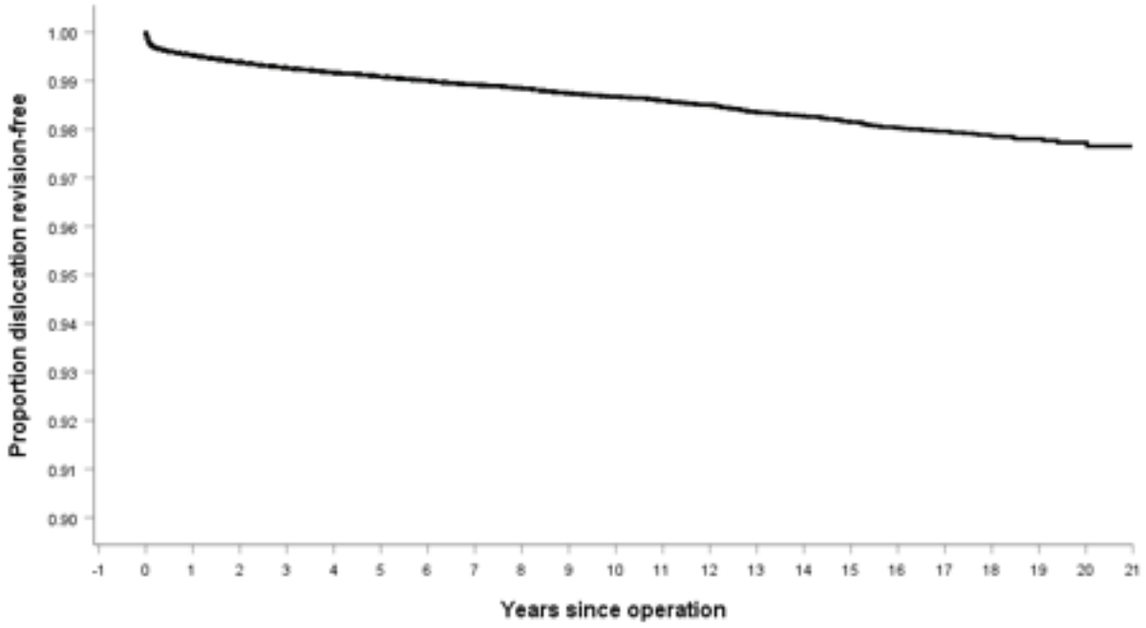


The following K M graphs are for the six main individual reasons for revision:

Deep infection

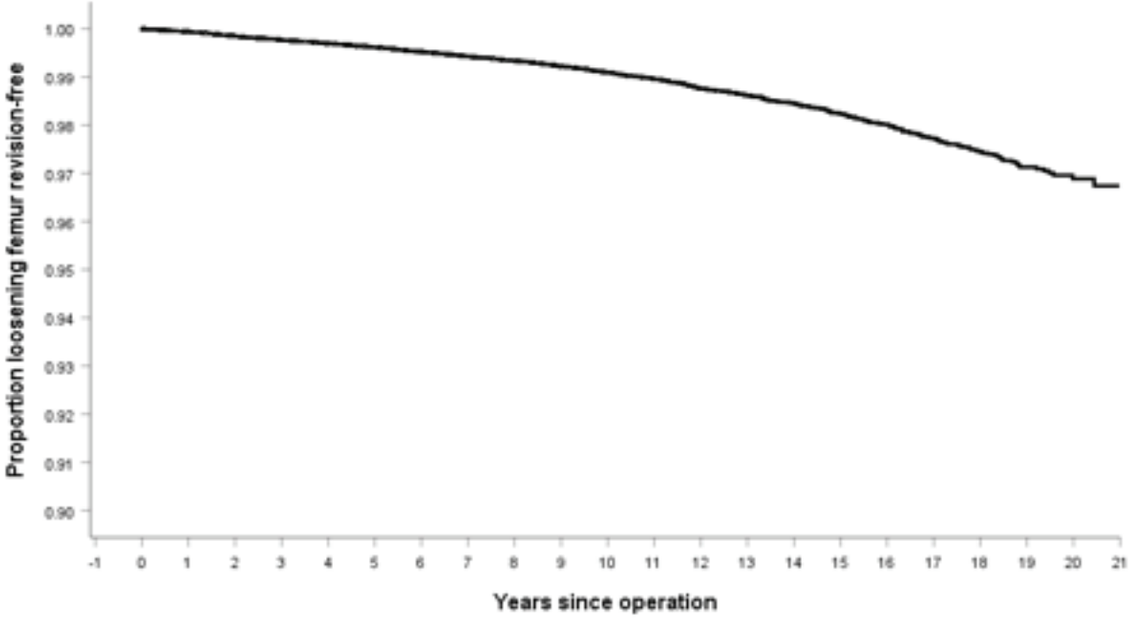


Dislocation

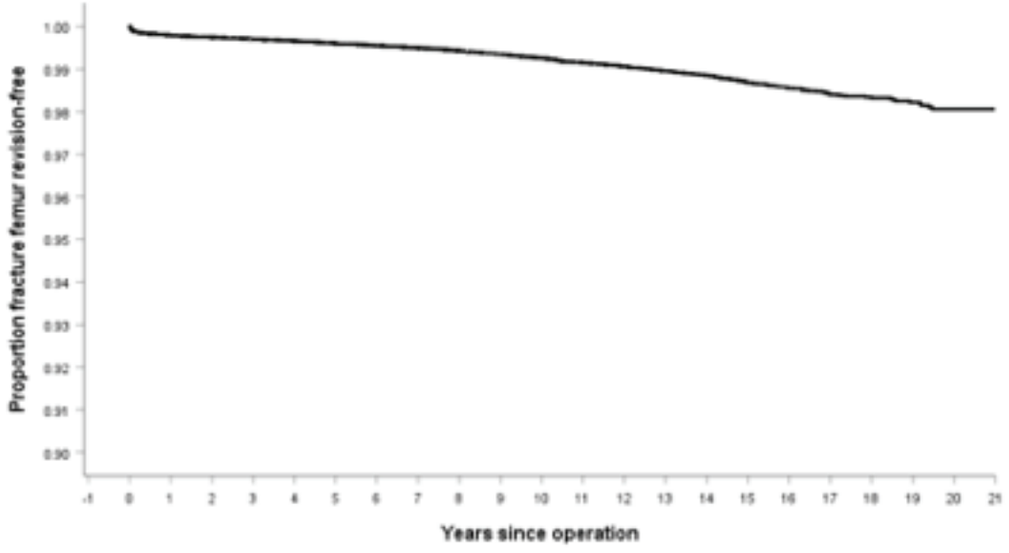


Loosening acetabular component

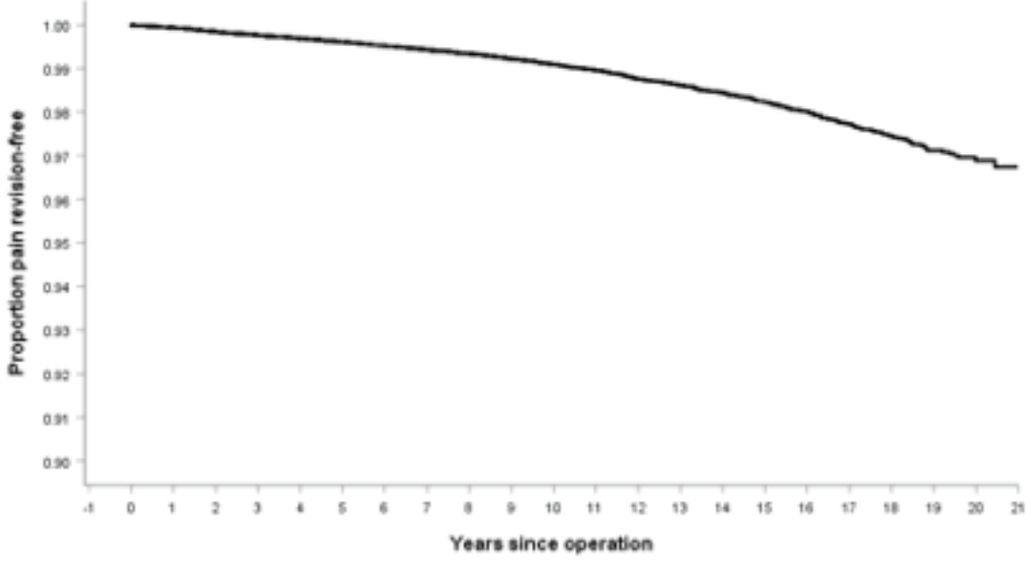
Loosening femoral component



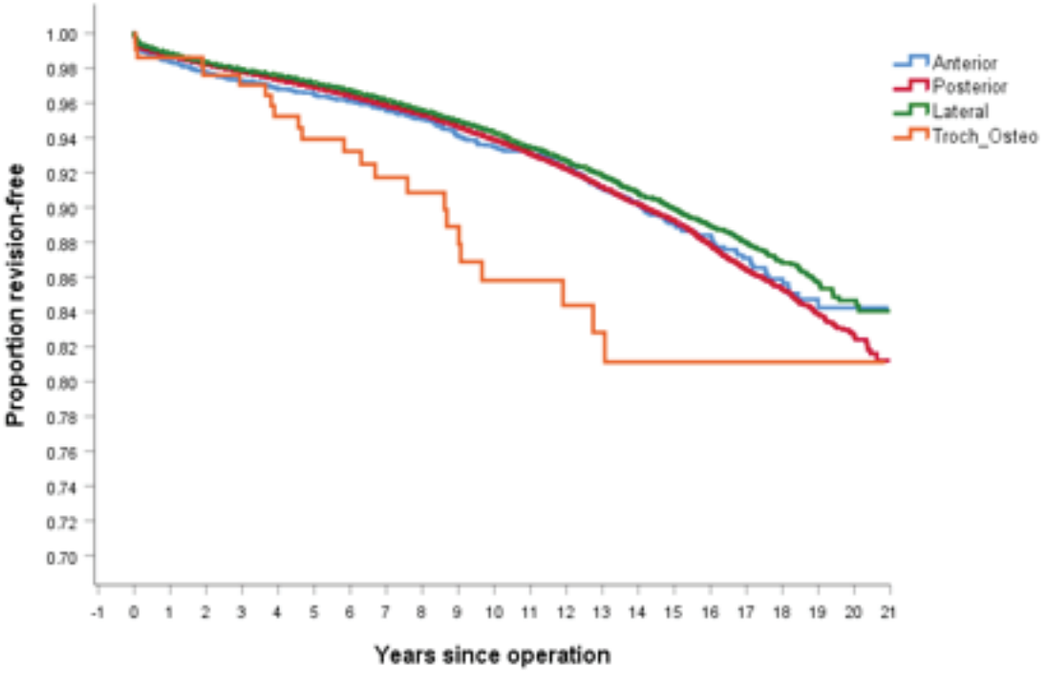
Fracture femur



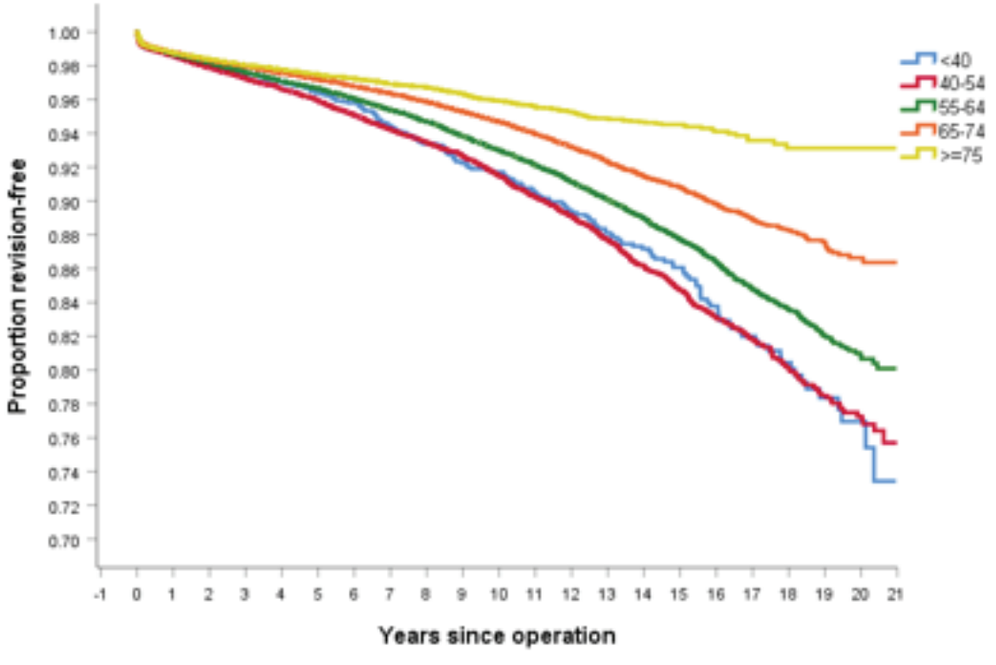
Pain



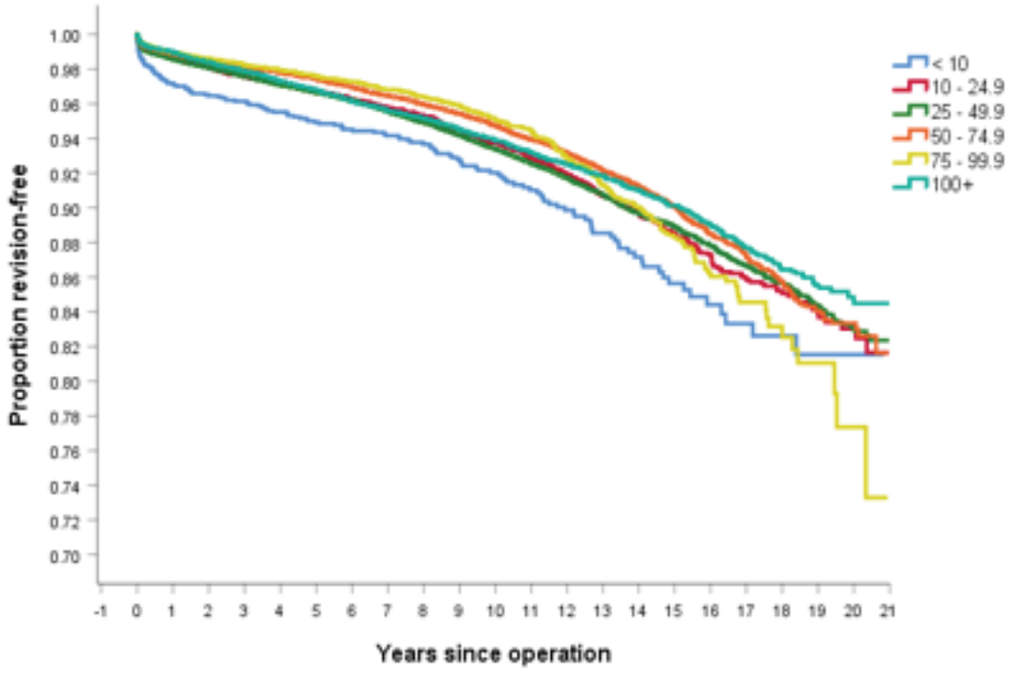
Survival for surgical approach



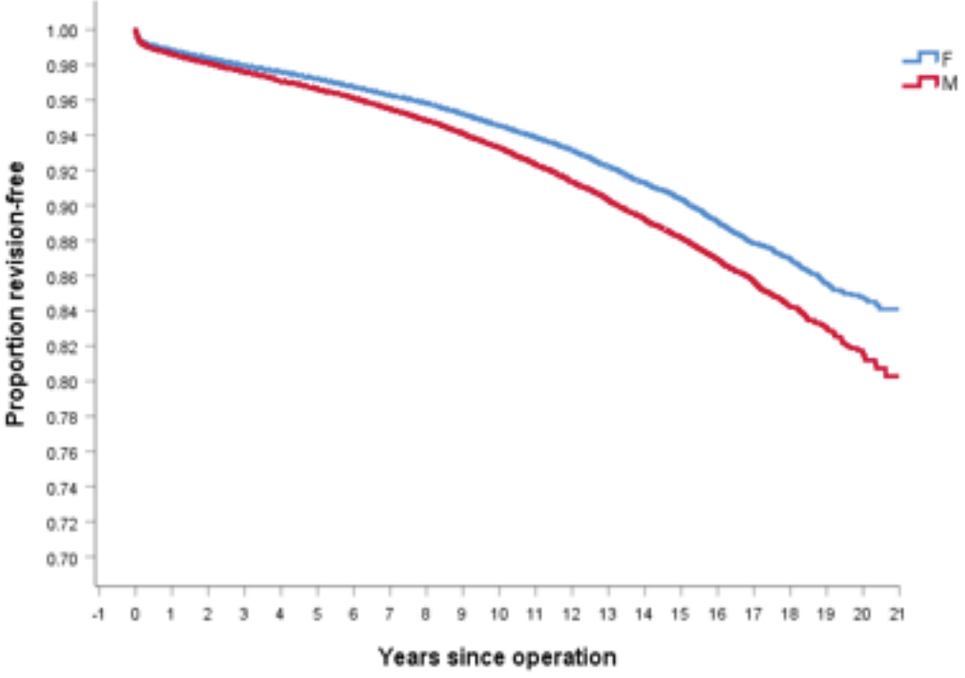
Survival for age bands



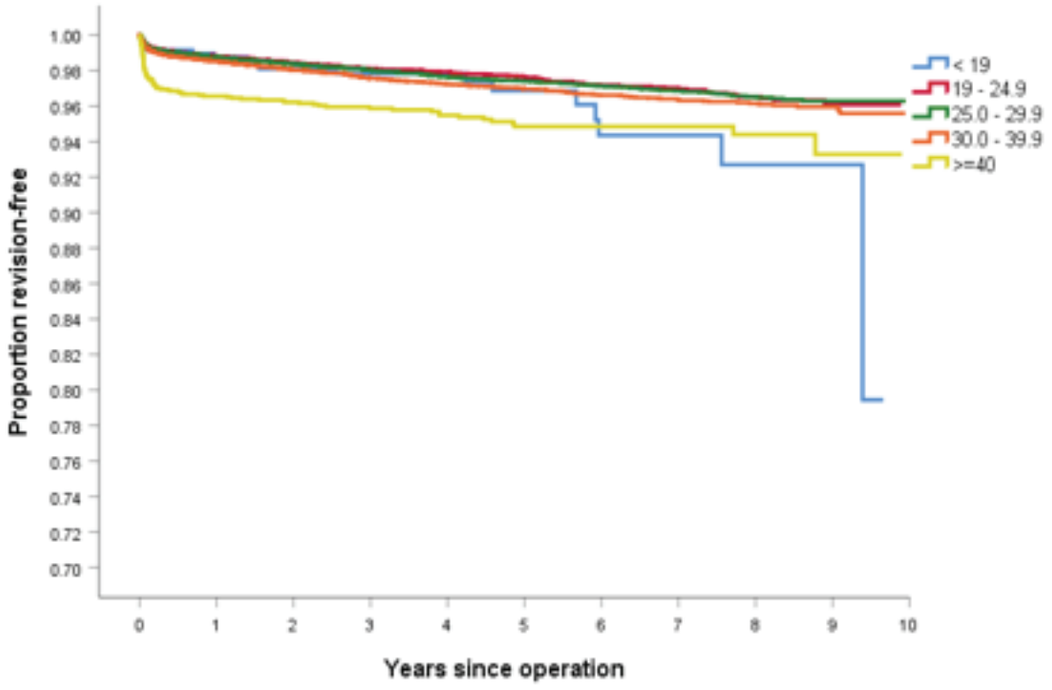
Survival for surgeon annual output



Survival male vs female



Survival vs BMI



Re-revisions of conventional hips

Analyses were undertaken of hip re-revisions.

There were 1,141 registered conventional hip replacements that had been revised twice, 273 that had been revised three times, 77 that had been revised four times, 26 that had been revised 5 times and 8 that had been revised 6 times. There was 1 patient who has now had 13 revisions.

Second revision

Time between the first and second revisions averaged 880 days, with a range of 0 – 6,601 and a standard deviation of 1,172. This compares to an average of 2,200 days between the primary and first revision.

Reason for revision

Deep infection	353
Dislocation	315
Loosening femoral component	138
Loosening acetabulum component	138
Pain	109
Fracture femur	84

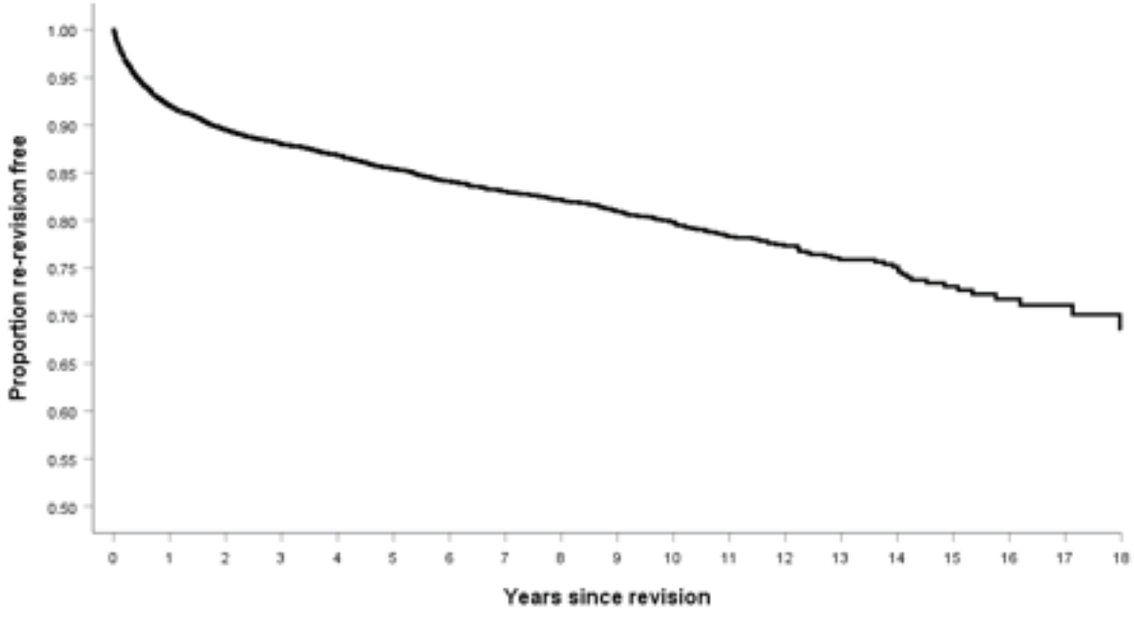
Revision

Change of head	763
Change of liner	528
Change of acetabulum	308
Change of femoral	309
Change of all	309

Re-revisions

No. Ops.	Observed component years	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
7,665	38,930	1,141	2.93	2.76	3.11

Years	Percentage re-revision free	No. in each year
1	92.02	6,233
2	89.51	5,400
3	87.98	4,676
4	86.83	3,996
5	85.41	3,365
6	84.11	2,801
7	83.06	2,258
8	82.15	1,775
9	80.92	1,354
10	79.84	1,049
11	78.29	782
12	77.32	567
13	75.88	395
14	75.13	281
15	73.06	195
16	71.75	129
17	71.10	77



Third revision

The average time between second and third revisions for the 273 arthroplasties was 593 days with a range of 1 – 4,451 and a standard deviation of 817.

Fourth revision

There were n = 77 registered.

Fifth revision

There were 26 registered.

Sixth revision

There were 8 registered.

One patient has had n = 13 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.

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 one year period, and as at July 2020, there were 33,852 primary hip questionnaire responses registered six months post-surgery. The average hip score was 40.36 (standard deviation 7.61, range 48 – 0).

Scoring	> 41	19,019
Scoring	34 – 41	9,358
Scoring	27 – 33	3,259
Scoring	< 27	2,223

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 12,641 individual patients.

At five years post-surgery, 89% of these patients achieved an excellent or good score and had an average of 42.39.

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 8,812 individual patients.

At ten years post-surgery, 87% of these patients achieved an excellent or good score and had an average of 41.93.

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 hip scores for 3,495 individual patients.

At fifteen years post-surgery, 86% of these patients achieved an excellent or good score and had an average of 41.45.

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 twenty years post-surgery.

This dataset represents sequential Oxford hip scores for 652 individual patients.

At twenty years post-surgery, 84% of these patients achieved an excellent or good score and had an average of 40.66

Oxford Scores (at 6 m) vs BMI Status

BMI	Mean	Standard Error of Mean	Number/ group
< 19	39.35	0.839	88
19 - 24	40.83	0.160	2,003
25 - 29	40.68	0.122	3,448
30 - 39	39.30	0.143	2,875
40+	37.33	0.528	265
Total	**40.14**	**0.080**	**8,679**

Revision hip questionnaire responses

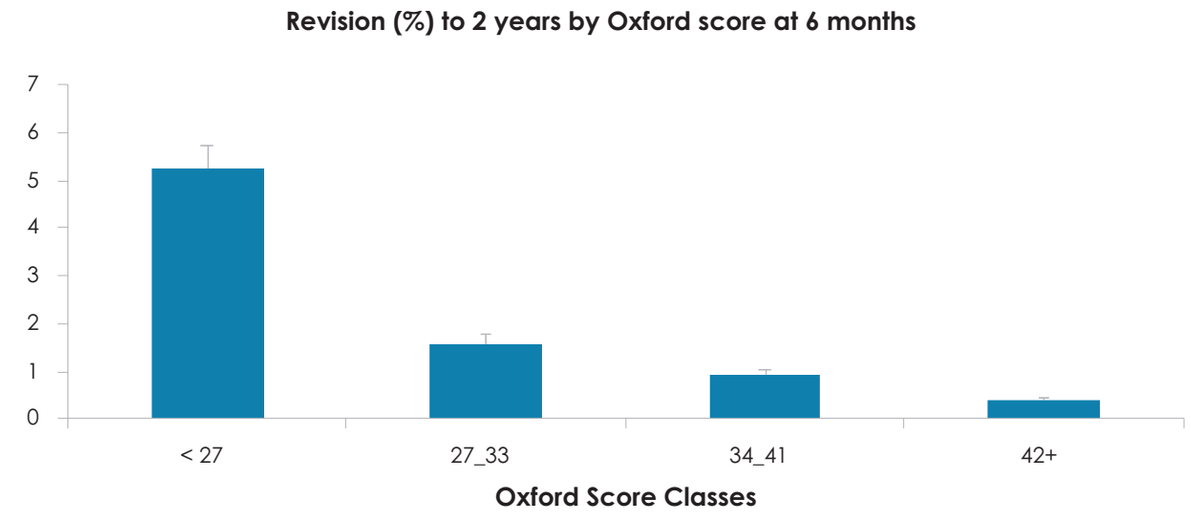
There were 10,834 revision hip responses with 62% achieving an excellent or good score. This group includes all revision hip procedures including revisions of primary arthroplasties performed prior to 1999. The average revision hip score was 34.99 (standard deviation 9.89, range 48 – 2).

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

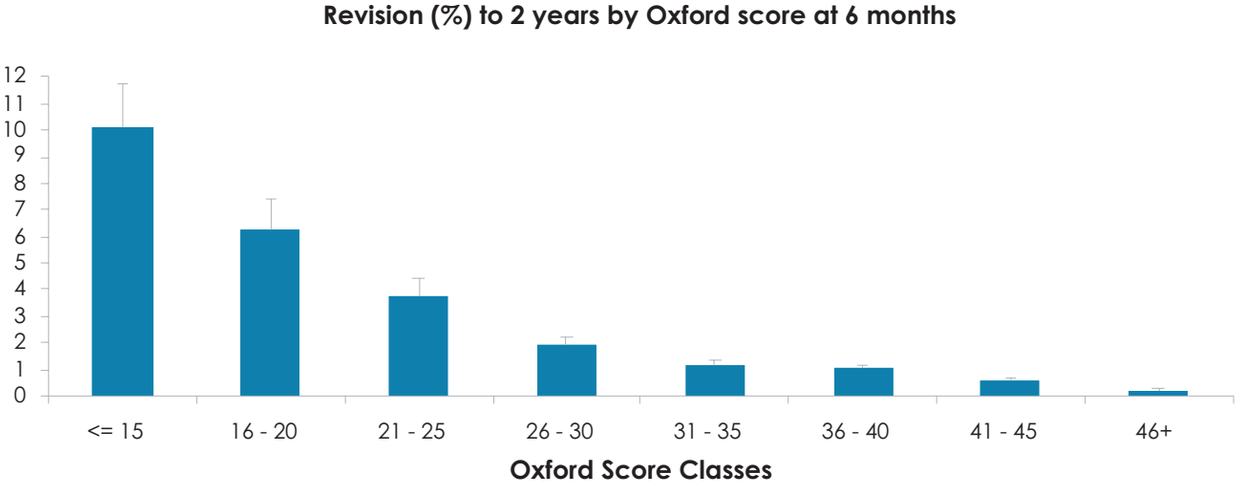
By plotting the patients' six month scores in the Kalairajah groupings against the proportion of hips revised for that same group it demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 13 times the risk of a revision within two years compared to a person with a score >42.



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	1,932	101	5.23	0.51
27_33	2,826	44	1.56	0.23
34_41	8,219	76	0.92	0.11
42+	16,811	68	0.40	0.05

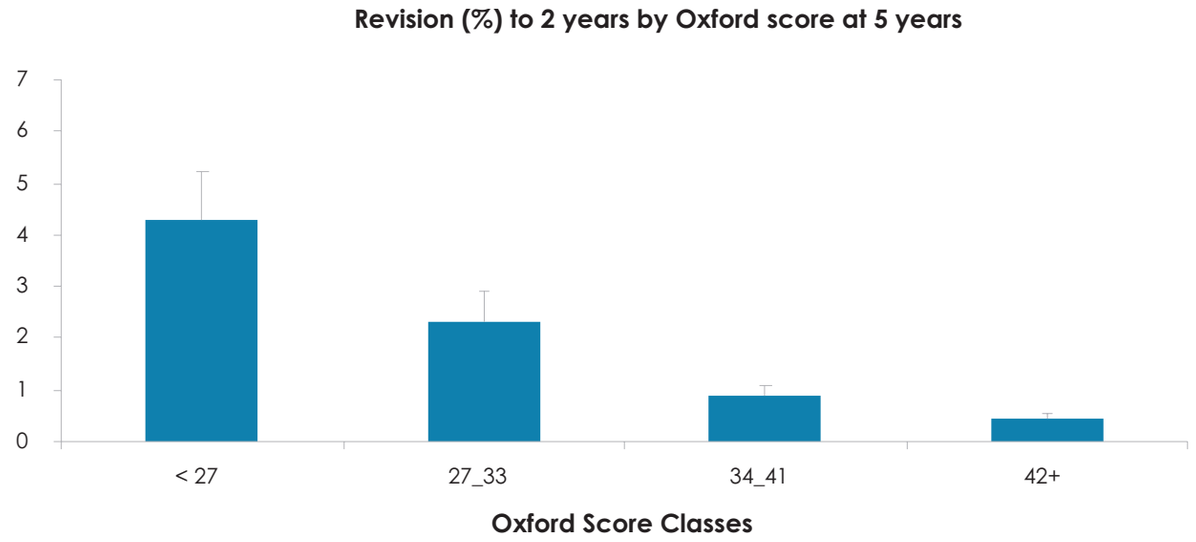
In view of the large number of six month Oxford scores it is possible with statistical significance to further break down the score groupings to demonstrate an even more convincing relationship between score and risk of revision within two years.



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 >42.

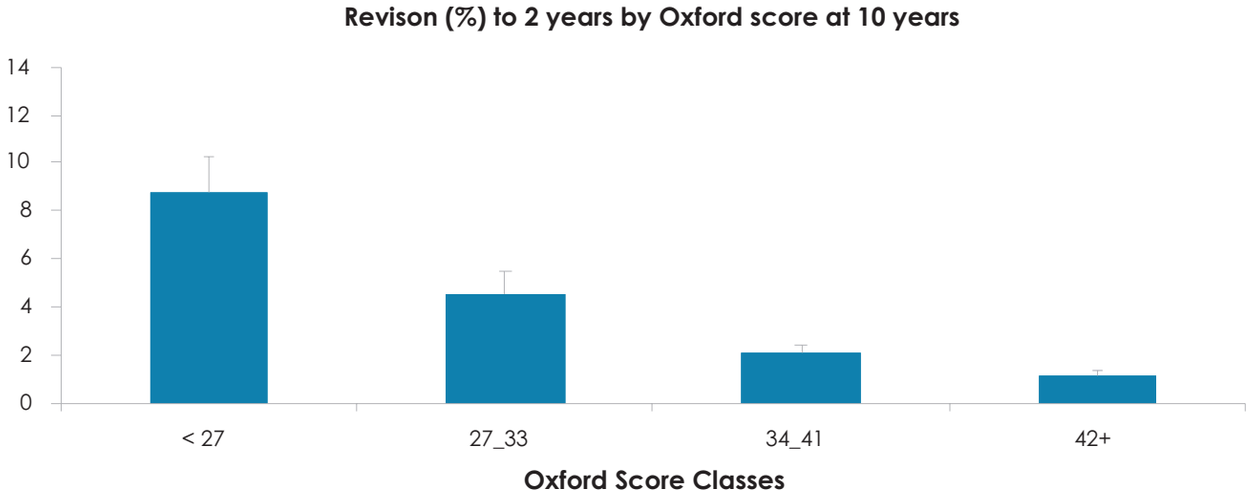


Revision risk versus Kalairajah groupings of Oxford scores within two years of the five year score date.

Kalairajah Group	Number in Group	Number revised	%	Standard error
< 27	468	20	4.27	0.93
27_33	688	16	2.33	0.57
34_41	2,031	18	0.89	0.21
42+	7,476	34	0.45	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 8 times the risk of a revision within two years compared to a person with a score >42.



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	375	33	8.80	1.46
27_33	486	22	4.53	0.94
34_41	1,340	28	2.09	0.39
42+	4,567	54	1.18	0.16

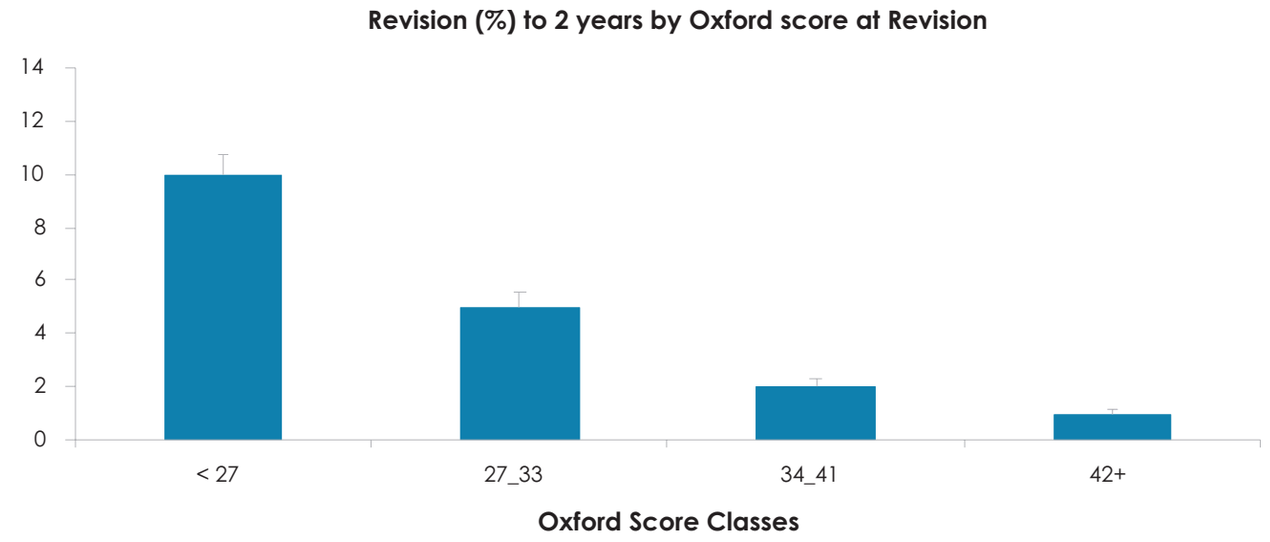
Fifteen year score and revision arthroplasty

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 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 9 times the risk of a revision within two years compared to a person with a score >42.

Kalairajah Group	Number in group	Number revised	%	Standard error
< 27	162	17	10.49	2.41
27_33	183	7	3.83	1.42
34_41	515	17	3.30	0.79
42+	1,654	20	1.21	0.27

Prediction of second revision from six month score following first revision

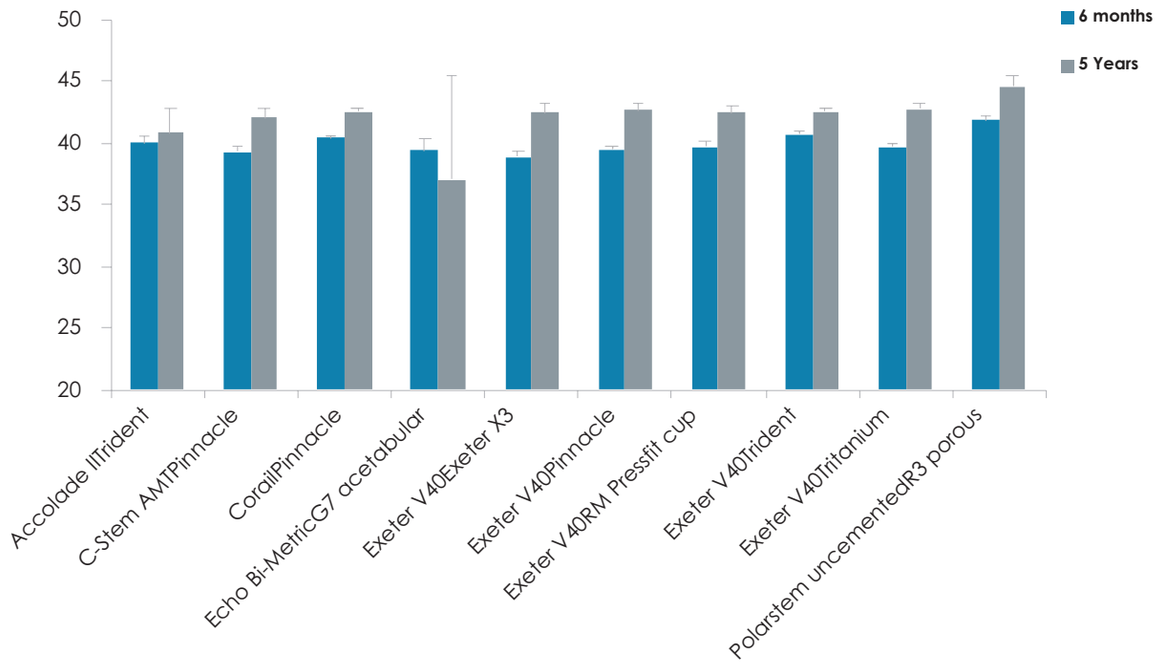
Plotting the patients' six month scores, following their first revision in the Kalairajah groupings, against the proportion of hips revised for that same group, again demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 10 times the risk of a revision within two years compared to a person with a score >42.



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	1,506	150	9.96	0.77
27_33	1,452	72	4.96	0.57
34_41	2,669	55	2.06	0.27
42+	2,864	28	0.98	0.18

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



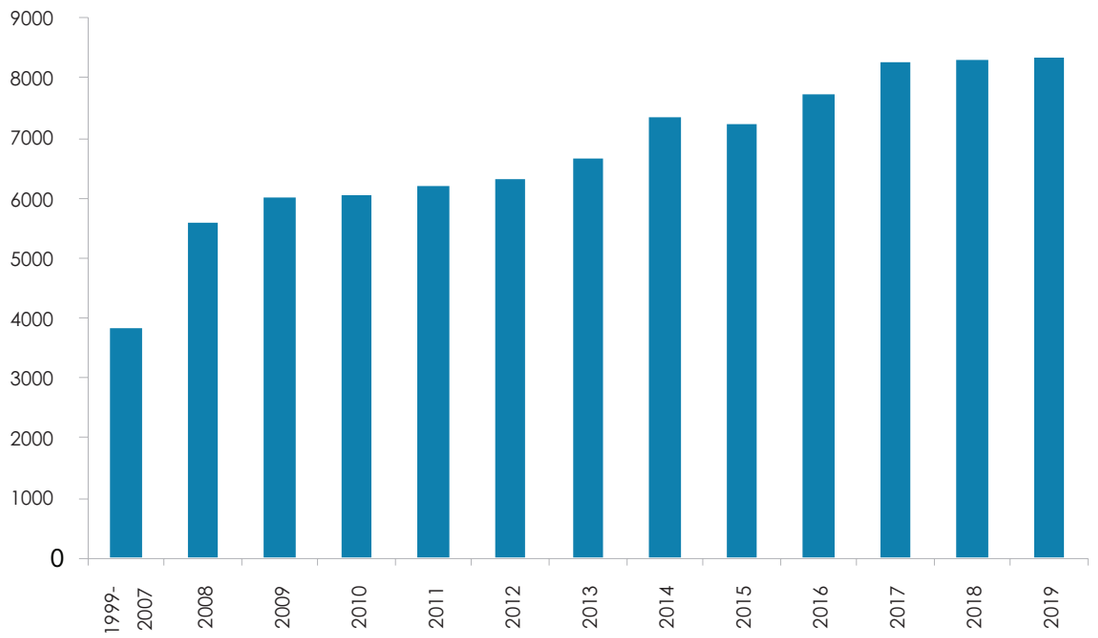
KNEE ARTHROPLASTY

PRIMARY KNEE ARTHROPLASTY

The **twenty one** year report analyses data for the period January 1999 – December 2019. There were 119,109 primary knee procedures registered, an additional 8,431 compared to last year's report.

The 119,109 includes 679 patello-femoral prostheses with 77 registered in 2019.

Number of operations by year



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	61,518	57,591
Percentage	51.65	48.35
Mean age	68.52	67.86
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.70	9.24

Conventional knee arthroplasty

	Female	Male
Number	61,022	57,408
Percentage	51.53	48.47
Mean age	68.59	67.89
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.65	9.22

Patello-femoral arthroplasty

	Female	Male
Number	496	183
Percentage	73.05	26.95
Mean age	59.94	60.11
Maximum age	89.39	90.72
Minimum age	31.15	31.25
Standard dev.	11.37	11.16

Body Mass Index

For the ten-year period 2010 - 2019, there were 49,923 BMI registrations for primary knee replacements. The average was 31.34 (obese) with a range of 15 – 69 and a standard deviation of 6.00.

Previous operation

None	100,163
Menisectomy	11,913
Osteotomy	1,682
Ligament reconstruction	1,736
Internal fixation	929
Synovectomy	189

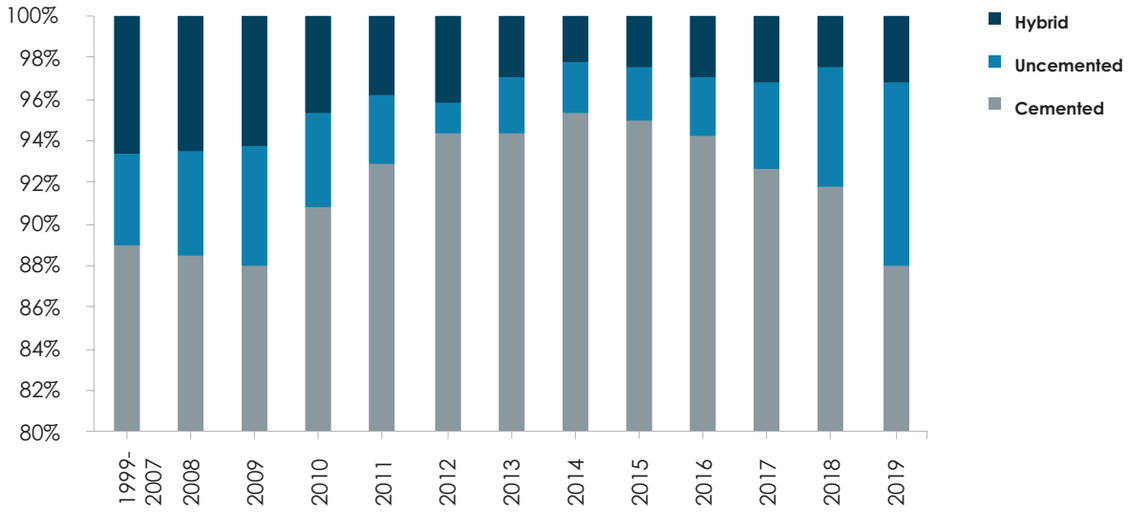
Diagnosis	
Osteoarthritis	113,108
Rheumatoid arthritis	2,451
Post fracture	1,258
Post ligament disruption	1068
Other inflammatory	876
Avascular necrosis	390
Tumour	103

Approach	
Medial parapatellar	107,452
Image guided	16,659
Other	2,791
Lateral parapatellar	1,471
Minimally invasive surgery	241
Robot navigation	152

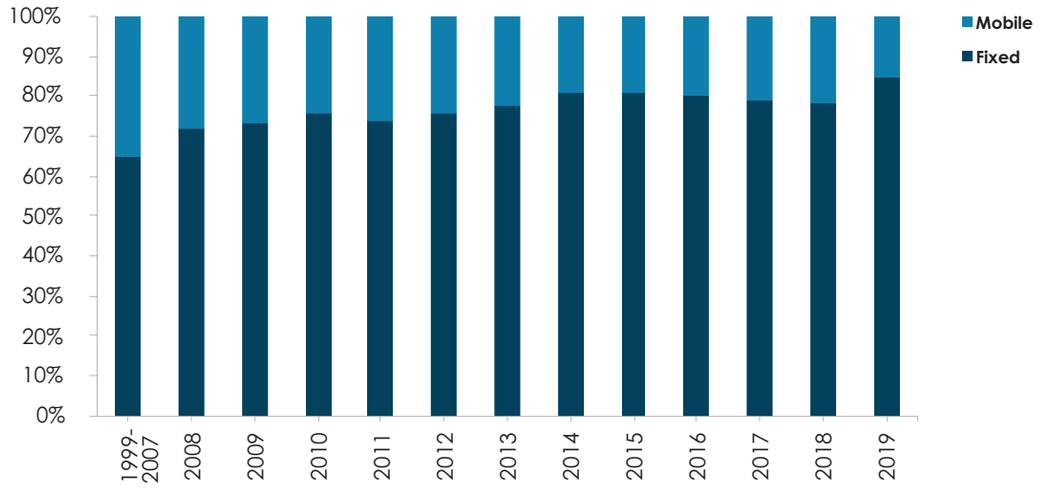
Bone graft	
Femoral autograft	481
Femoral allograft	21
Femoral synthetic	14
Tibial autograft	116
Tibial allograft	23
Tibial synthetic	5

Comparison of proportions of cemented vs uncemented vs hybrid by year

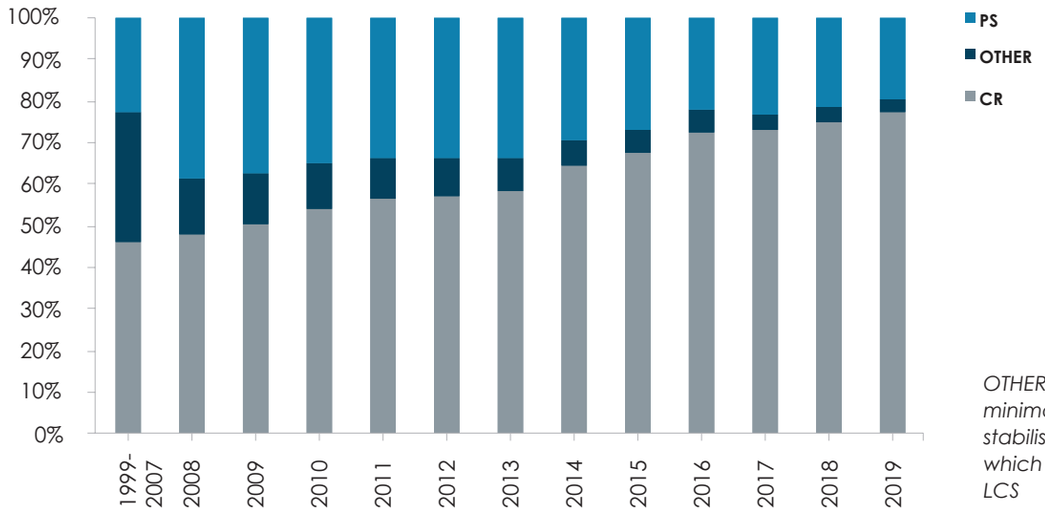
Hybrid knees have a cemented tibia and uncemented femur. Uncemented TKA fixation remains common in NZ, but in the last 3 years the previous downward trend has reversed.



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

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	113,239 95%

Operating theatre

Conventional	65,086
Laminar flow	52,969
Space Suits	140,404

ASA Class

This was introduced with the updated forms at the beginning of 2005. For the fifteen year period 2005 – 2019, there were 96,680 (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	10,642	11
2	61,454	63.5
3	24,189	25
4	395	0.5

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 fifteen-year period 2005 – 2019.

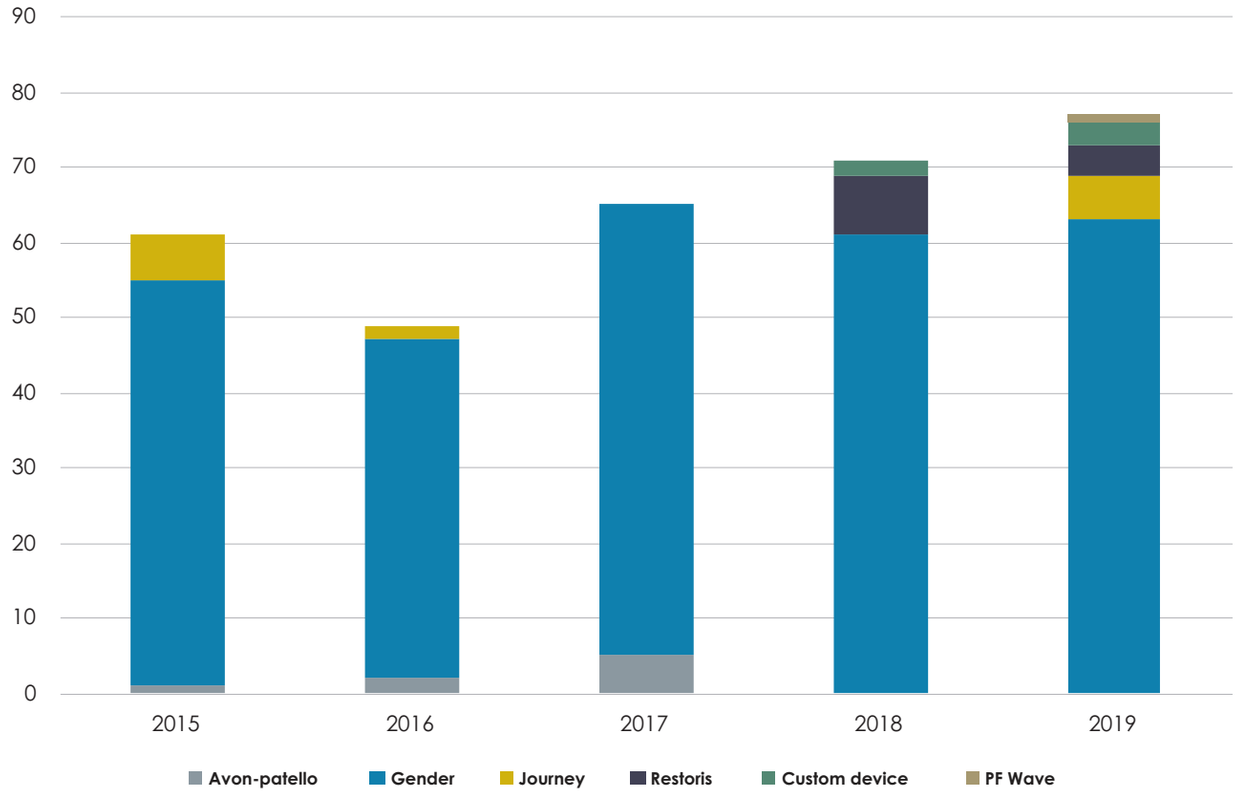
Consultant	83,376
Advanced trainee supervised	7,759
Advanced trainee unsupervised	1,926
Basic trainee	1,661

Prosthesis usage

Patello-femoral prostheses used in 2019

Gender	63
Journey PFJ	6
Restoris Mako	4
Custom device	3
PF Wave	1

Patello-femoral prostheses used for five years 2015 - 2019



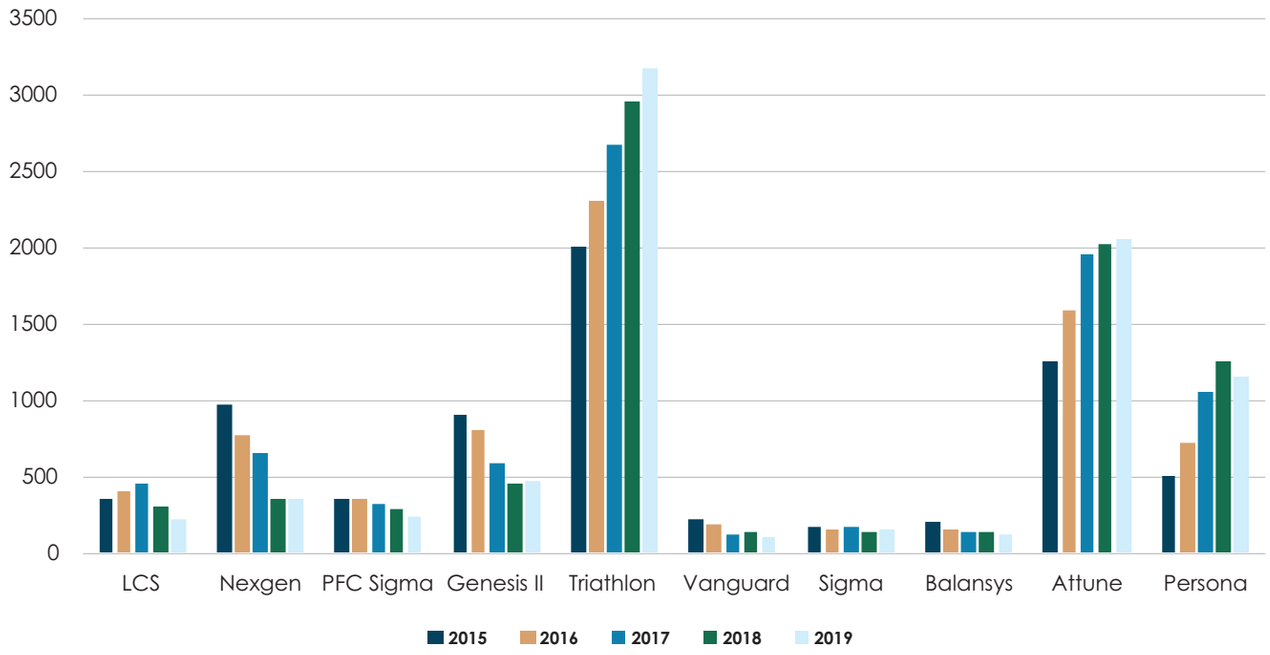
In 2019 there were 77 patello-femoral procedures registered to 32 surgeons.

Conventional primary knees

Top ten knee prostheses used in 2019

Triathlon	3,179
Attune	2,055
Persona	1,160
Genesis II	478
Nexgen	359
PFC Sigma	243
LCS	229
Sigma	158
Balansys	128
Vanguard	109

Most used knee prostheses per year for five years 2015 – 2019



Surgeon and hospital workload

Surgeons

In 2019, 229 surgeons performed 8,415 total knee replacements, an average of 37 procedures per surgeon.

39 surgeons performed less than 10 procedures and 76 performed more than 40.

Hospitals

In 2019 primary knee replacement was performed in 50 hospitals. 27 were public hospitals and 23 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-one year period January 1999 – December 2019, there were 9,283 revision knee procedures registered. This is an additional 636 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	4,374	4,909
Percentage	47.12	52.88
Mean age	69.84	69.25
Maximum age	96.45	98.39
Minimum age	10.57	15.00
Standard dev.	10.22	10.06

Body Mass Index

For the ten-year period 2010 - 2019, there were 2,108 BMI registrations for revision knee replacements. The average BMI was 31.40 (obese) with a range of 15 – 65 and a standard deviation of 6.17.

REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTIES

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

There were 4,024 revisions of the 118,430 primary conventional total knee replacements (3.4%) and 66 revisions of the 679 patello-femoral prostheses (9.7%), a total of 4,090 revisions.

Conventional knee replacement analysis

Time to revision

Average	1,562 days
Maximum	7,361 days
Minimum	1 day
Standard deviation	1,486 days

Reason for revision

Pain	1,160
Deep infection	1,082
Primary patellar component	1,023
Loosening tibial	958
Loosening femoral component	430
Loosening patellar component	81
Fracture femur	80
Fracture tibia	45

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

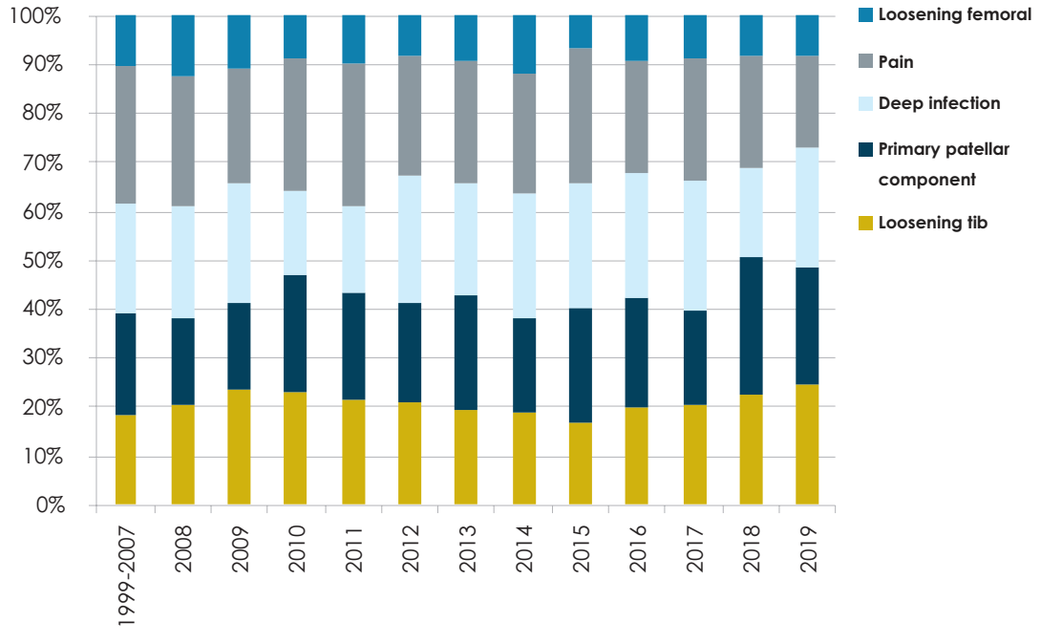
NB each year column does not add up to exactly 100% as often more than one cause for revision is listed and there are other reasons for revision other than the five above listed in the registry

	Loosening tibial component		Primary patellar component		Deep infection		Pain		Loosening femoral component	
Years	Count	%	Count	%	Count	%	Count	%	Count	%
0	49	5.1	118	11.5	422	39.0	149	12.8	17	3.9
1	89	9.3	264	25.8	198	18.3	291	25.1	40	9.3
2	116	12.1	166	16.2	108	10.0	178	15.3	35	8.1
3	104	10.9	99	9.7	92	8.5	113	9.7	33	7.7
4	84	8.8	69	6.7	53	4.9	77	6.6	44	10.2
5	79	8.2	46	4.5	38	3.5	60	5.2	36	8.4
6	84	8.8	46	4.5	39	3.6	48	4.1	30	7.0
7	66	6.9	47	4.6	28	2.6	50	4.3	28	6.5
8	48	5.0	32	3.1	20	1.8	43	3.7	25	5.8
9	55	5.7	29	2.8	20	1.8	25	2.2	26	6.0
10	41	4.3	26	2.5	18	1.7	35	3.0	22	5.1
>10	143	14.9	81	7.9	46	4.3	91	7.8	95	22.0
Total	**958**		**1,023**		**1,082**		**1,160**		**431**	

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

	Loosening tibial component	Primary patellar component	Deep infection	Pain	Loosening femoral component
Years	**Number**	**Number**	**Number**	**Number**	**Number**
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
2019	109	104	108	83	36

Percentage of the 5 main reasons for revision by year



Patello-Femoral Arthroplasty

Revision of patello-femoral knees

Of the 679 registered, n = 66 have been revised.

Time to revision

Average	1,822 ays
Maximum	5,718 days
Minimum	108 days
Standard deviation	1,467 days

Reason for revision

Pain	22
Loosening patellar	4
Deep infection	5

Patellar resurfacing

62% of the 118,430 registered conventional primary knees did not have the patella resurfaced and 38% did have the patella resurfaced. Of the group that was not resurfaced, 1,018 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.

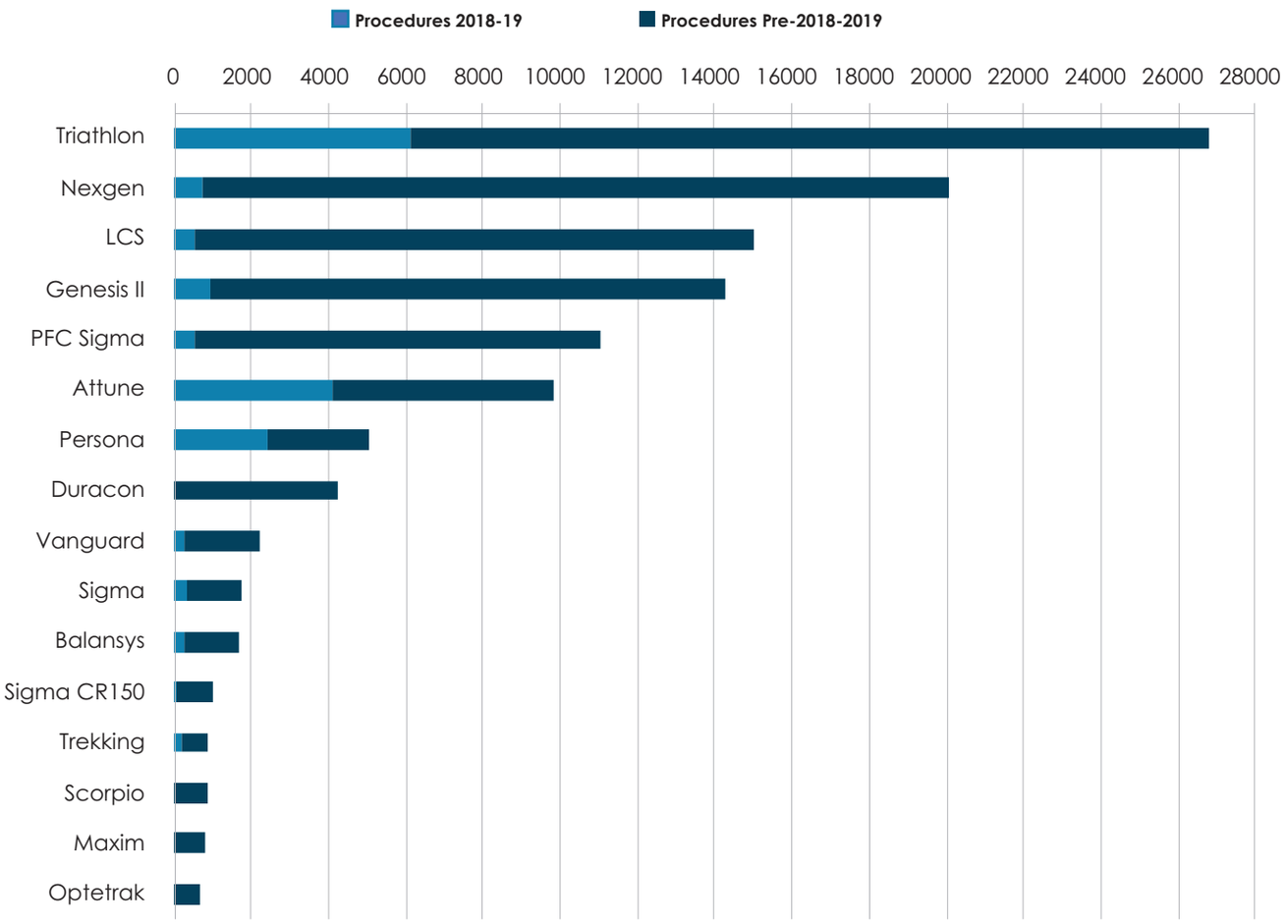
ii) Rate/100 component years

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.

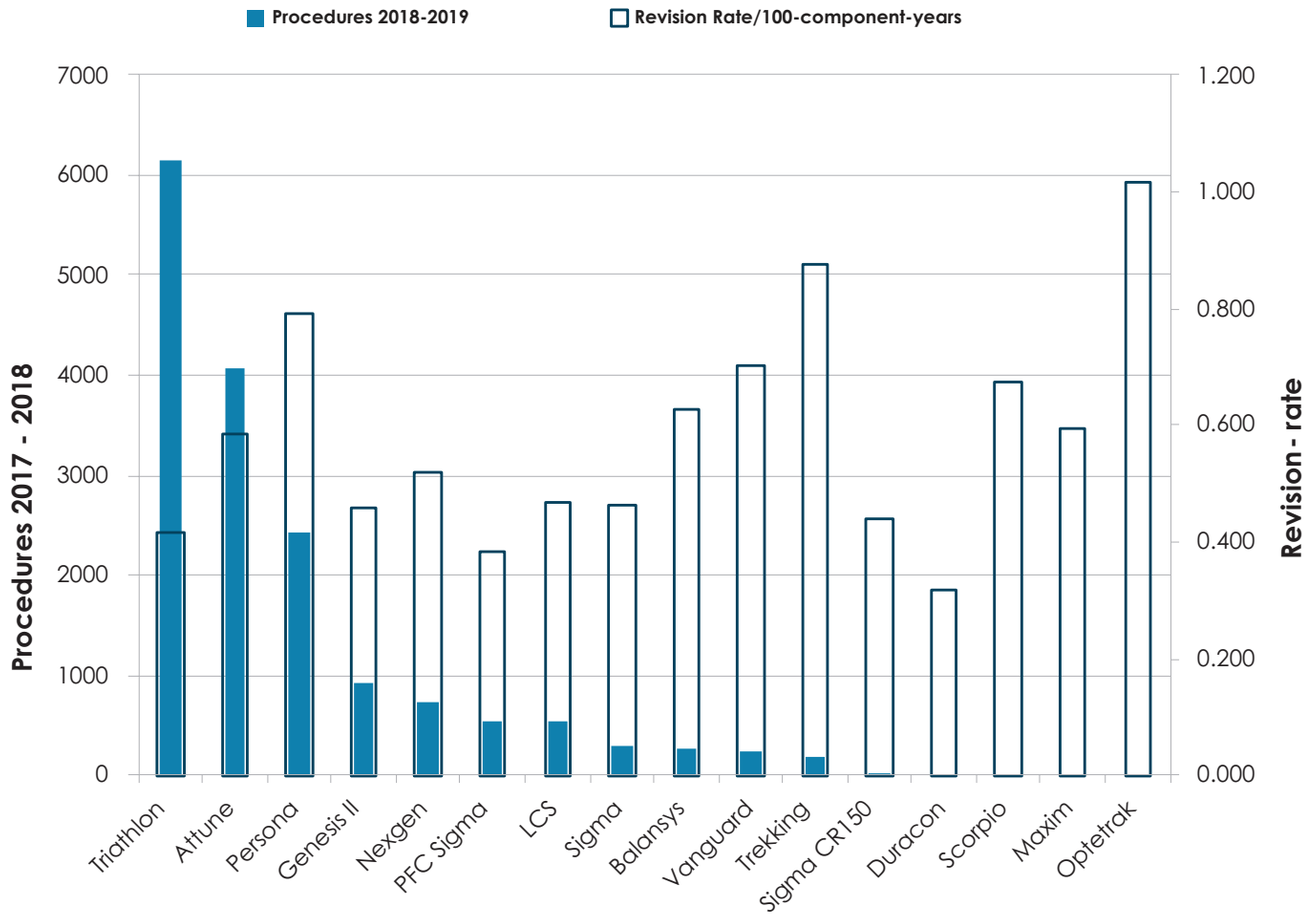
Statistical Significance

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.

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.



All Primary Conventional Knee Arthroplasties

No. Ops	Observed component years	Number revised	Rate/100 component-years	Exact 95% confidence interval	
118,430	841,619	4,024	0.48	0.46	0.49

Revision Rate of Individual Knee Prostheses Sorted by Number of Arthroplasties

(Minimum of 50 arthroplasties)

Prosthesis	No. Ops	Observed component years	Number revised	Rate/100 component-years	Exact 95% confidence interval	
Triathlon	26,831	138,702.6	575	0.415	0.381	0.449
Nexgen	20,066	169,860.4	879	0.517	0.484	0.553
LCS	14,998	148,988.0	695	0.466	0.432	0.502
Genesis II	14,302	111,106.0	507	0.456	0.417	0.497
PFC Sigma	11,055	99,557.4	379	0.381	0.343	0.420
Attune	9,855	24,717.2	144	0.583	0.489	0.684
Persona	5,016	11,108.4	88	0.792	0.631	0.971
Duracon	4,213	51,357.3	164	0.319	0.271	0.371
Vanguard	2,183	12,779.3	90	0.704	0.566	0.866
Sigma	1,758	8,634.1	40	0.463	0.331	0.631
Balansys	1,683	7,947.1	50	0.629	0.467	0.829
Sigma CR150	1,015	7,089.2	31	0.437	0.297	0.621
Trekking	873	3,532.1	31	0.878	0.596	1.246
Scorpio	852	10,069.5	68	0.675	0.520	0.851
Maxim	822	10,138.0	60	0.592	0.452	0.762
Optetrak	661	6,207.7	63	1.015	0.780	1.298
AGC	376	4,584.8	18	0.393	0.233	0.620
MBK	255	3,508.2	17	0.485	0.282	0.776
Insall/Burstein	249	3,030.6	48	1.584	1.154	2.081
Legion	246	1,123.4	9	0.801	0.366	1.521
Journey II BCS	235	600.5	5	0.833	0.225	1.825
Advance	157	1,863.6	6	0.322	0.118	0.701
Journey BCS	143	1,249.6	13	1.040	0.525	1.728
Saiph	120	254.3	3	1.180	0.243	3.447
AMK	95	1,306.4	2	0.153	0.019	0.553
ROCC	66	679.4	6	0.883	0.324	1.922

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	3,030.6	48	1.584	1.154	2.081
Saiph	120	254.3	3	1.180	0.243	3.447
Journey BCS*	143	1,249.6	13	1.040	0.525	1.728
Optetrak*	661	6,207.7	63	1.015	0.780	1.298
ROCC	66	679.4	6	0.883	0.324	1.922
Trekking*	873	3,532.1	31	0.878	0.596	1.246
Journey II BCS	235	600.5	5	0.833	0.225	1.825
Legion	246	1,123.4	9	0.801	0.366	1.521
Persona*#	5,016	11,108.4	88	0.792	0.631	0.971
Vanguard*#	2,183	12,779.3	90	0.704	0.566	0.866
Scorpio*	852	10,069.5	68	0.675	0.520	0.851
Balansys	1,683	7,947.1	50	0.629	0.467	0.829
Maxim	822	10,138.0	60	0.592	0.452	0.762
Attune	9,855	24,717.2	144	0.583	0.489	0.684
Nexgen	20,066	169,860.4	879	0.517	0.484	0.553
MBK	255	3,508.2	17	0.485	0.282	0.776
LCS	14,998	148,988.0	695	0.466	0.432	0.502
Sigma	1,758	8,634.1	40	0.463	0.331	0.631
Genesis II	14,302	111,106.0	507	0.456	0.417	0.497
Sigma CR150	1,015	7,089.2	31	0.437	0.297	0.621
Triathlon	26,831	138,702.6	575	0.415	0.381	0.449
AGC	376	4,584.8	18	0.393	0.233	0.620
PFC Sigma	11,055	99,557.4	379	0.381	0.343	0.420
Advance	157	1,863.6	6	0.322	0.118	0.701
Duracon	4,213	51,357.3	164	0.319	0.271	0.371
AMK	95	1,306.4	2	0.153	0.019	0.553

*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 CI's.*

*Those marked with a # as well as an * indicate those combinations used during 2019.*

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 component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Insall/Burstein*	249	3,030.6	48	1.584	1.154	2.081
Optetrak*	281	2,676.6	32	1.196	0.818	1.688
Saiph	120	254.3	3	1.180	0.243	3.447

Prosthesis	No. Ops	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Journey BCS*	143	1,249.6	13	1.040	0.525	1.728
Trekking*	872	3,532.1	31	0.878	0.596	1.246
Journey II BCS	234	600.2	5	0.833	0.225	1.826
Legion	243	1,114.2	9	0.808	0.369	1.533
Persona*	5,008	11,106.0	88	0.792	0.631	0.971
Vanguard*	2,163	12,659.6	88	0.695	0.554	0.852
Scorpio*	852	10,069.5	68	0.675	0.520	0.851
Balansys	1,683	7,947.1	50	0.629	0.467	0.829
Maxim	822	10,138.0	60	0.592	0.452	0.762
Attune	9,469	24,232.5	139	0.574	0.480	0.675
Nexgen	19,172	162,130.3	845	0.521	0.486	0.557
MBK	246	3,395.7	17	0.501	0.292	0.802
Genesis II	14,249	110,475.8	501	0.453	0.415	0.495
Sigma CR150	1,015	7,089.2	31	0.437	0.297	0.621
Triathlon	25,657	135,886.7	559	0.411	0.378	0.447
Sigma	1,460	7,561.8	31	0.410	0.273	0.574
AGC	376	4,584.8	18	0.393	0.233	0.620
LCS	9,653	100,901.1	395	0.391	0.354	0.432
PFC Sigma	10,157	93,234.1	341	0.366	0.327	0.406
Duracon	3,432	41,278.8	137	0.332	0.279	0.392
Advance	157	1,863.6	6	0.322	0.118	0.701
ROCC	36	389.6	1	0.257	0.006	1.430
AMK	95	1,306.4	2	0.153	0.019	0.553

The Insall/Burstein, Trekking, Journey, Scorpio, Vanguard, Persona and Optetrak have significantly higher revision rates than the overall rate of 0.48/100 component years at the 95% confidence interval. The Vanguard, Trekking and Persona prostheses were implanted in 2019.

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

(Minimum of 50 primary registered arthroplasties)

Femur Prosthesis	No. Ops	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Optetrak	380	3,531.1	31	0.878	0.597	1.246
Sigma	298	1,072.3	9	0.839	0.384	1.593
Genesis II	51	619.8	5	0.807	0.218	1.768
Triathlon	241	1,682.6	11	0.654	0.326	1.170
PFC Sigma	891	6,247.3	38	0.608	0.424	0.826
LCS	2,296	21,733.4	99	0.456	0.370	0.555
Nexgen	674	5,815.5	24	0.413	0.264	0.614
Duracon	321	4,561.2	15	0.329	0.176	0.529

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	362	468.0	4	0.855	0.233	2.188
LCS	3,049	26,353.4	201	0.763	0.661	0.876
Nexgen	220	1,914.5	10	0.522	0.233	0.927
Triathlon	933	1,133.2	5	0.441	0.143	1.030
Duracon	460	5,517.3	12	0.217	0.106	0.368

The uncemented LCS were still implanted in 2019 and have 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

Femoral Prosthesis	Mobile/ Fixed	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
AGC	Fixed	376	4,584.8	18	0.393	0.233	0.620
AMK	Fixed	95	1,306.4	2	0.153	0.019	0.553
Balansys	Fixed	1,668	7,926.5	50	0.631	0.468	0.832
Duracon	Fixed	4,207	51,271.6	163	0.318	0.270	0.370
Genesis II	Fixed	14,285	111,071.2	507	0.456	0.417	0.498
Insall/Burstein	Fixed	249	3,030.6	48	1.584	1.154	2.081
Journey	Fixed	287	1,737.9	18	1.036	0.592	1.602
Triathlon	Fixed	24,530	132,481.7	552	0.417	0.382	0.453
LCS	Mobile	14,996	148,982.7	695	0.466	0.432	0.502
Maxim	Fixed	822	10,138.0	60	0.592	0.452	0.762
MBK	Mobile	255	3,508.2	17	0.485	0.282	0.776
Trekking	Mobile	862	3,507.5	30	0.855	0.577	1.221
Persona	Fixed	5,008	11,106.0	88	0.792	0.631	0.971
Nexgen	Fixed	17,083	143,318.5	761	0.531	0.494	0.570
	Mobile	2,714	24,770.6	99	0.400	0.325	0.487
PFC Sigma	Fixed	7,570	64,038.6	251	0.392	0.344	0.443
	Mobile	3,451	35,238.5	127	0.360	0.300	0.429
Scorpio	Fixed	737	8,716.8	58	0.665	0.500	0.854
	Mobile	104	1,278.1	7	0.548	0.220	1.128
Sigma	Fixed	629	3,079.2	10	0.325	0.145	0.576
	Mobile	1,110	5,442.2	30	0.551	0.372	0.787
Sigma CR150	Fixed	188	1,365.1	11	0.806	0.402	1.442
	Mobile	826	5,719.0	20	0.350	0.214	0.540
Attune	Fixed	3,449	10,889.9	55	0.505	0.380	0.657
	Mobile	4,470	12,469.8	77	0.617	0.484	0.767

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	81,284	566,514.8	2,655	0.47	0.45	0.49
Mobile	28,813	241,022.1	1,103	0.46	0.43	0.49

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 discrepancy 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	382.4	4	1.046	0.285	2.679
Insall/Burstein	PS	249	3,030.6	48	1.584	1.154	2.081
LCS	PS	70	518.4	2	0.386	0.047	1.394
Legion	PS	195	919.4	7	0.761	0.272	1.495
Sigma CR150	CR	1,015	7,089.2	31	0.437	0.297	0.621
Attune	CR	6,112	15,957.9	100	0.627	0.507	0.759
	PS	3,714	8,739.9	44	0.503	0.366	0.676
Balansys	CR	1,555	7,405.7	42	0.567	0.409	0.767
	PS	113	516.3	8	1.549	0.669	3.053
Genesis II	CR	7,640	63,990.6	205	0.320	0.277	0.367
	PS	6,655	47,066.0	302	0.642	0.570	0.717
Maxim	CR	657	8,054.9	41	0.509	0.360	0.683
	PS	165	2,083.1	19	0.912	0.549	1.424
Nexgen	CR	9,628	79,561.4	325	0.408	0.365	0.455
	PS	10,077	88,480.0	525	0.593	0.543	0.646
Optetrak	CR	437	4,129.8	35	0.848	0.590	1.179
	PS	224	2,078.0	28	1.347	0.895	1.947
Persona	CR	3,932	8,152.1	56	0.687	0.519	0.892
	PS	1,076	2,954.0	32	1.083	0.727	1.529
PFC Sigma	CR	9,084	78,995.7	279	0.353	0.312	0.396
	PS	1,888	19,865.2	98	0.493	0.398	0.598
Scorpio	CR	739	8,916.6	57	0.639	0.479	0.822
	PS	111	1,136.4	11	0.968	0.452	1.675
Sigma	CR	314	1,338.2	0	0.000	0.000	0.276
	PS	1,443	7,289.7	40	0.549	0.386	0.739
Trekking	CR	330	1,359.3	11	0.809	0.404	1.448
	PS	532	2,148.1	19	0.884	0.515	1.353
Triathlon	CR	23,619	116,561.4	478	0.410	0.374	0.448
	PS	3,210	22,132.5	97	0.438	0.355	0.535
Vanguard	CR	1,568	9,225.1	58	0.629	0.477	0.813
	PS	591	3,479.9	32	0.920	0.629	1.298

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	66,644	410,830.3	1,718	0.42	0.40	0.44
Other	15,238	152,638.2	717	0.47	0.44	0.51
PS	30,353	212,913.9	1,317	0.62	0.59	0.65

The LCS prostheses account for the majority of the "Other" 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	108,095	760,008.9	3,547	0.47	0.45	0.48
Uncemented	5,082	35,877.0	238	0.66	0.58	0.75
Hybrid	5,253	45,733.6	239	0.52	0.46	0.59

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	
<40	359	3,575.8	49	1.37	1.00	1.80
40-54	9,386	72,856.0	632	0.87	0.80	0.94
55-64	33,072	247,510.4	1,491	0.60	0.57	0.63
65-74	45,615	326,556.9	1,371	0.42	0.40	0.44
>=75	29,998	191,120.3	481	0.25	0.23	0.27

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

Revision vs Gender

Gender	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Female	61,022	441,817.9	1,934	0.44	0.42	0.46
Male	57,408	399,801.6	2,090	0.52	0.50	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	
<40	291	2,889.5	37	1.28	0.89	1.74
40-54	8,057	60,855.6	505	0.83	0.76	0.90
55-64	29,588	218,600.5	1,304	0.60	0.56	0.63
65-74	42,088	299,449.5	1,262	0.42	0.40	0.45
>=75	28,071	178,213.7	439	0.25	0.22	0.27

Revision by Age Bands vs Arthroplasty Fixation

Uncemented	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
<40	32	350.7	7	2.00	0.80	4.11
40-54	723	6,451.9	77	1.19	0.94	1.49
55-64	1,815	13,348.9	92	0.69	0.55	0.84
65-74	1,678	10,984.7	50	0.46	0.34	0.60
>=75	834	4,740.8	12	0.25	0.13	0.44

Hybrid	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
<40	36	335.6	5	1.49	0.48	3.48
40-54	606	5,548.5	50	0.90	0.67	1.19
55-64	1,669	15,561.0	95	0.61	0.49	0.74
65-74	1,849	16,122.7	59	0.37	0.28	0.47
>=75	1,093	8,165.8	30	0.37	0.25	0.52

Revision vs Approach

Approach	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Medial	106,558	757,013.6	3,572	0.47	0.46	0.49
Lateral	1,431	11,960.5	79	0.66	0.52	0.82
Other	2,513	19,896.6	77	0.39	0.30	0.48

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	101,808	756,665.3	3,642	0.48	0.47	0.50
Yes	16,622	84,954.1	382	0.45	0.41	0.50

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	2,630	20,603.4	86	0.42	0.33	0.52
10-24	22,943	176,232.5	924	0.52	0.49	0.56
25-49	52,384	375,621.9	1,776	0.47	0.45	0.50
50-74	24,704	173,776.7	803	0.46	0.43	0.50
75-99	7,531	41,294.9	164	0.40	0.34	0.46
>=100	8,238	54,090.0	271	0.50	0.44	0.56

There is no significant difference between the groups, in contrast with findings on UKA outcomes by surgeon volume.

Revision vs ASA Status

ASA Class	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
1	10,466	67,056.6	337	0.50	0.45	0.56
2	61,062	365,761.6	1,732	0.47	0.45	0.50
3	24,122	129,419.5	717	0.55	0.51	0.60
4	394	1,763.1	12	0.68	0.35	1.19

Revision vs. BMI

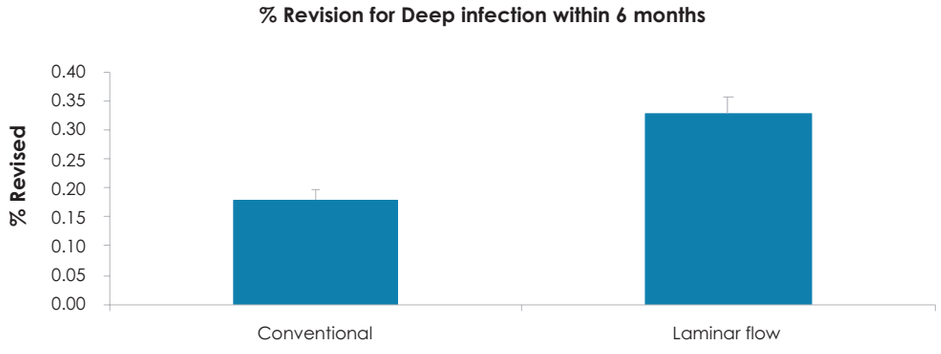
(BMI has been collected by the NZJR since 2010)

BMI	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
< 19	101	406.7	0	0.00	0.00	0.91
19 - 24	5,360	21,279.7	129	0.61	0.51	0.72
25 - 29	16,183	64,271.2	354	0.55	0.49	0.61
30 - 39	23,166	90,459.0	521	0.58	0.53	0.63
40+	4,699	18,162.8	142	0.78	0.66	0.92

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

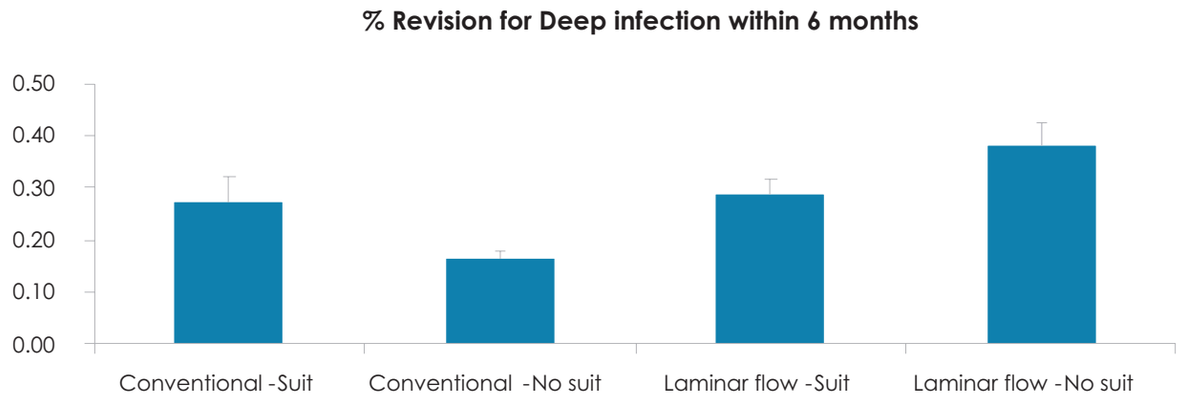
Revision for Deep Infection within six months versus Theatre Environment

Theatre Environment	Total number	Number revised	%	Standard error
Conventional	62,138	112	0.18	0.02
Laminar flow	50,450	166	0.33	0.03



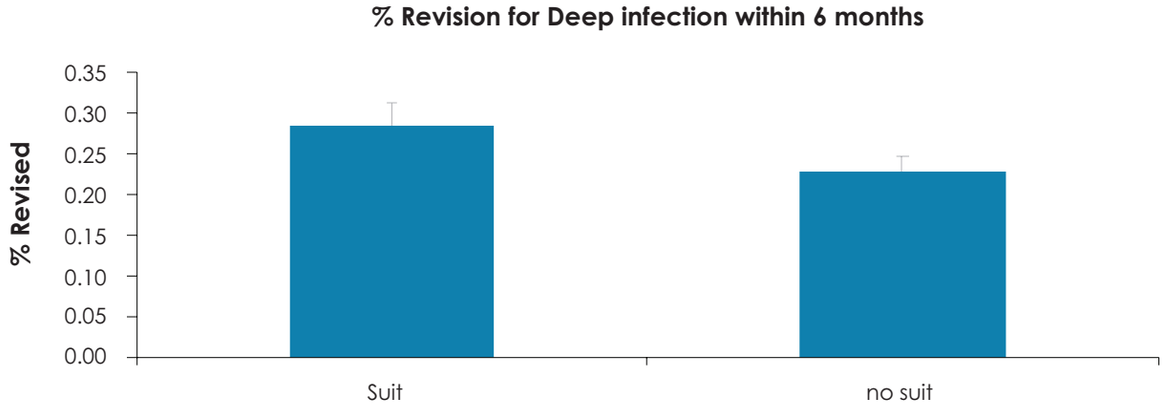
As with hip arthroplasty, there is a significant difference in knee revision rates (2x) for deep infection within six months of surgery between conventional and laminar flow theatres.

Theatre Environment	Suit/No Suit	Total number	Number revised	%	Standard error
Conventional-Suit	Suit	10,374	28	0.27	0.05
Conventional-No Suit	no Suit	51,764	84	0.16	0.02
Laminar flow-Suit	Suit	27,395	78	0.28	0.03
Laminar flow-No Suit	no Suit	23,055	88	0.38	0.04



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.

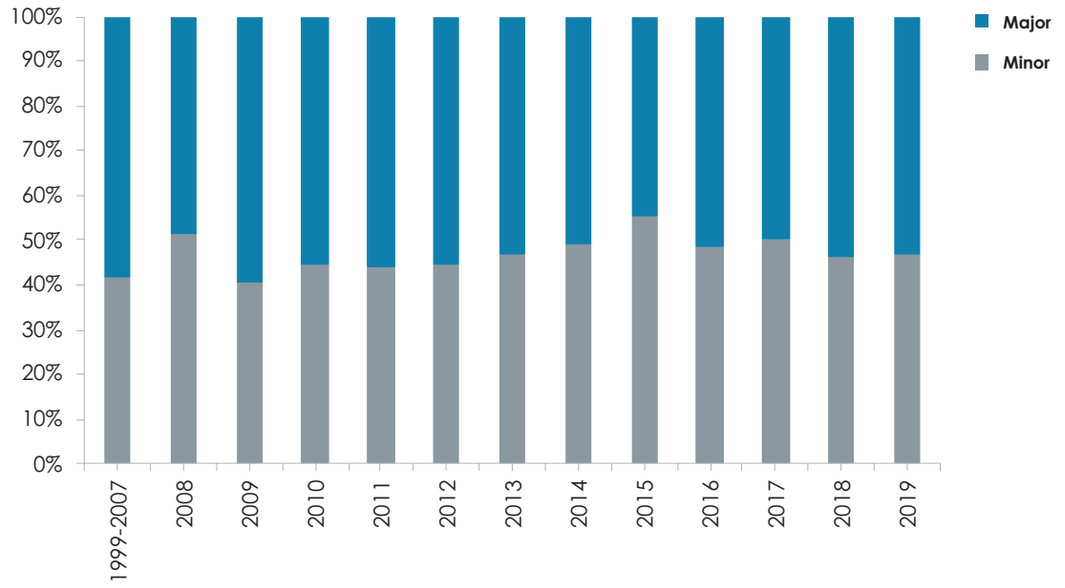
	Total number	Number revised	%	Standard error
Suit	38,491	110	0.29	0.03
No Suit	75,208	172	0.23	0.02



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.

Major/Minor Revision by Year

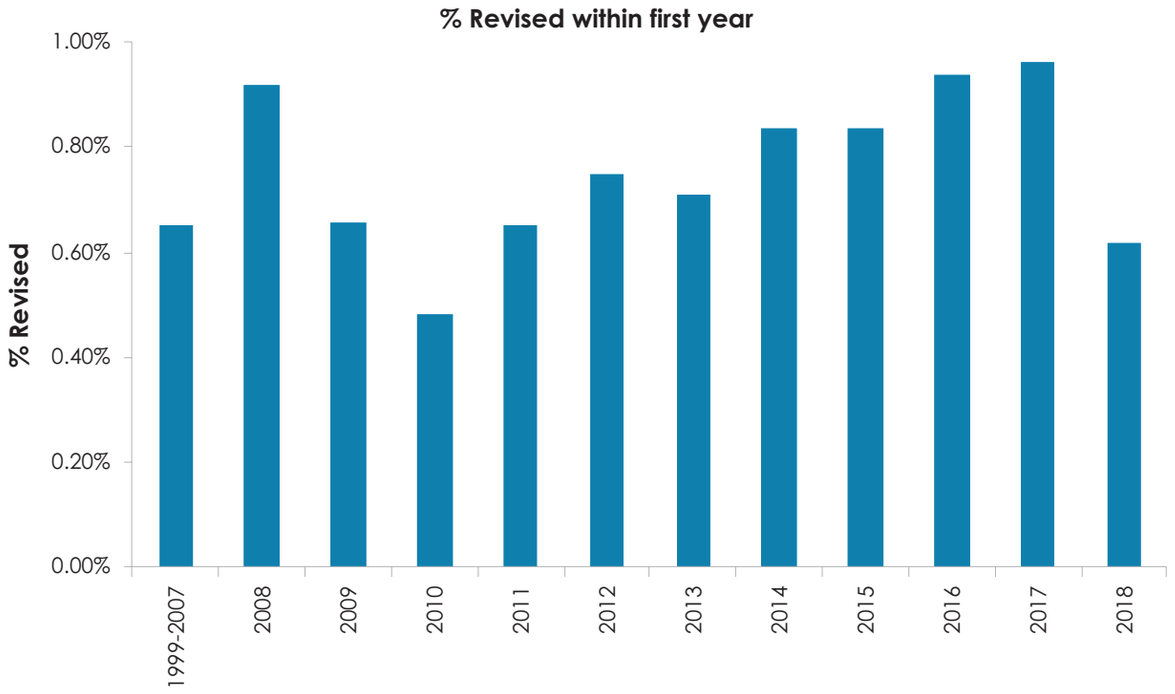


Re-revisions for major vs minor knee revisions

Major/Minor	No. Ops	Observed comp. yrs	Number revised	Rate/100 component years	Exact 95% confidence interval	
Minor	1,884	9,285	312	3.36	3.00	3.75
Major	2,140	11,309	310	2.74	2.44	3.06

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 component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
679	3,589	66	1.84	1.42	2.34

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

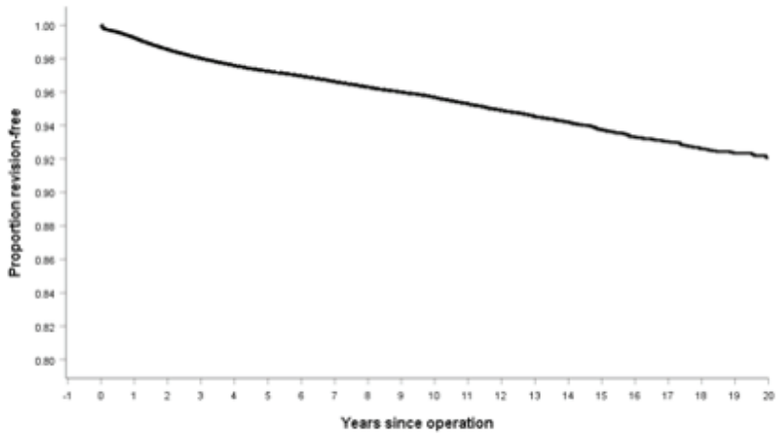
Revised to:

Total	60
Patello- Femoral	3
Uniknee	3

KAPLAN MEIER CURVES

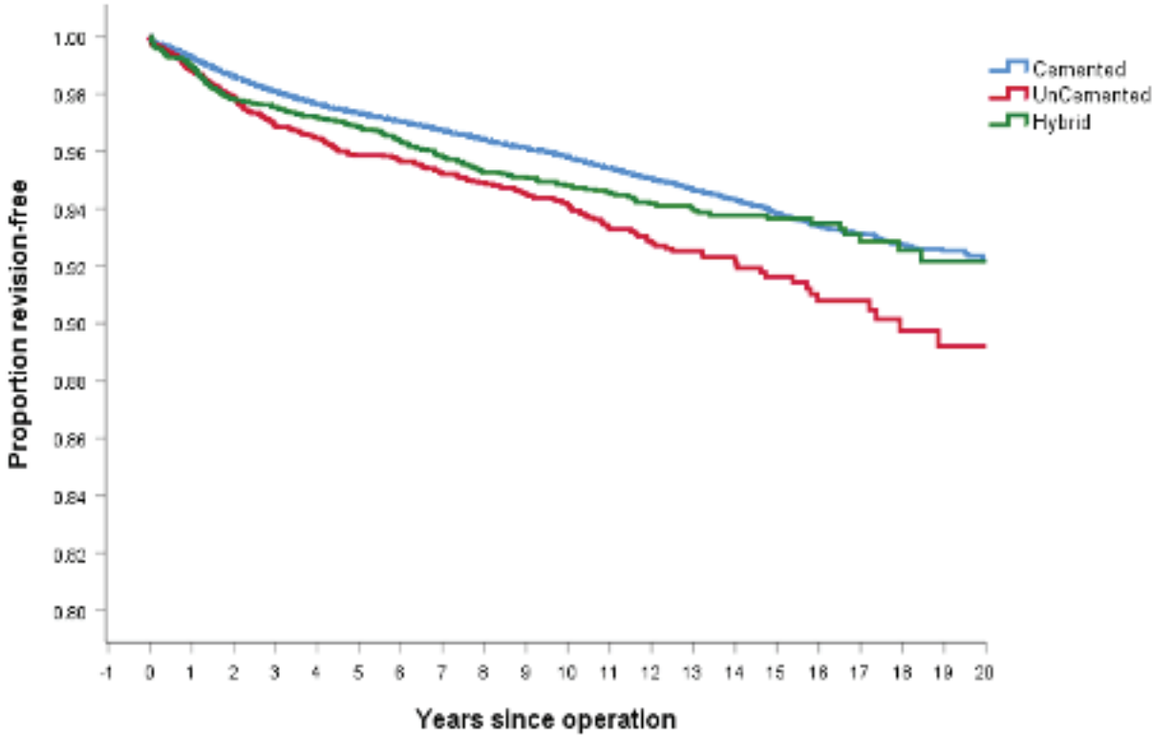
The following Kaplan Meier survival analyses are for the 21 years 1999 – 2019 with deceased patients censored at time of death.

All Knees

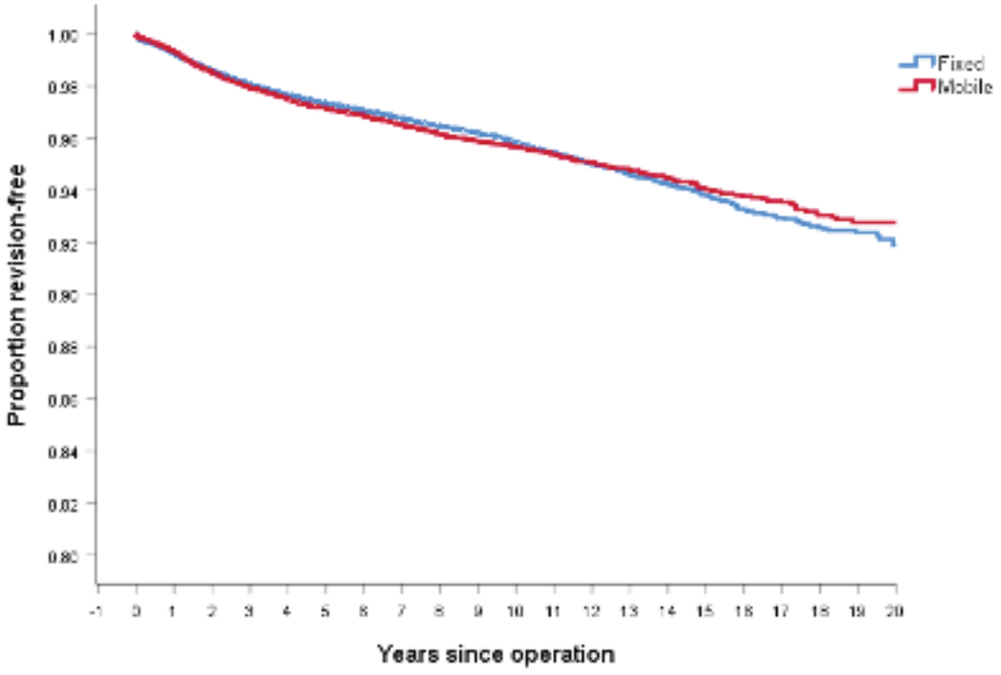


Years	% Revision-free	No. in each year
1	99.3%	108,343
2	98.5	98,221
3	98.0	88,273
4	97.6	79,027
5	97.3	70,369
6	97.0	61,731
7	96.6	53,882
8	96.3	46,569
9	96.0	39,632
10	95.7	33,084
11	95.3	27,050
12	94.9	21,785
13	94.5	16,776
14	94.2	12,753
15	93.7	9,211
16	93.3	6,518
17	93.0	4,634
18	92.6	3,164
19	92.3	1,831
20	92.1	724

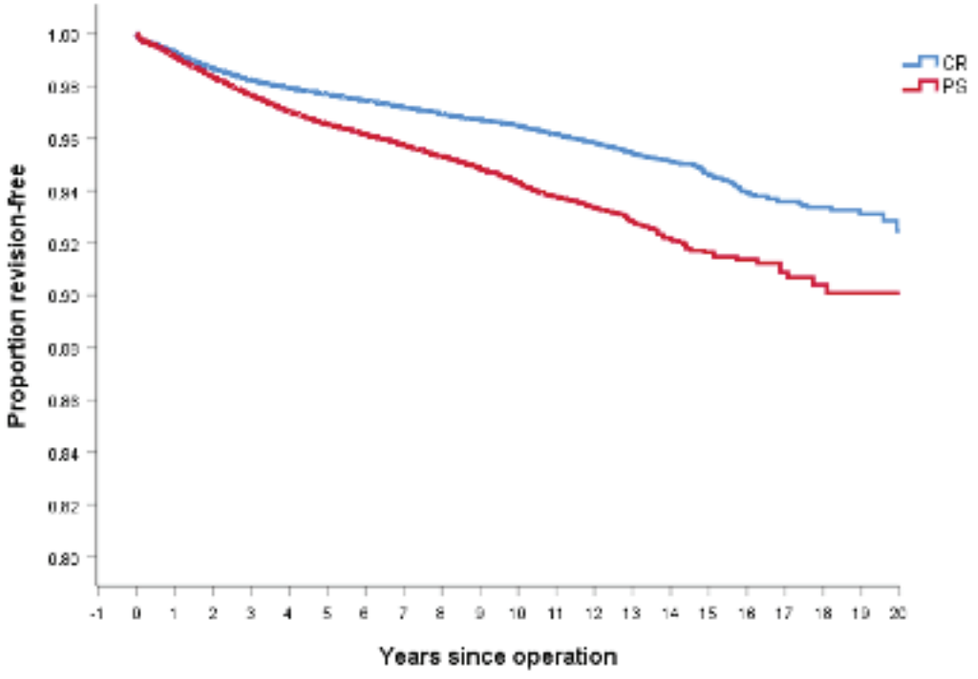
Cemented vs Uncemented vs Hybrid



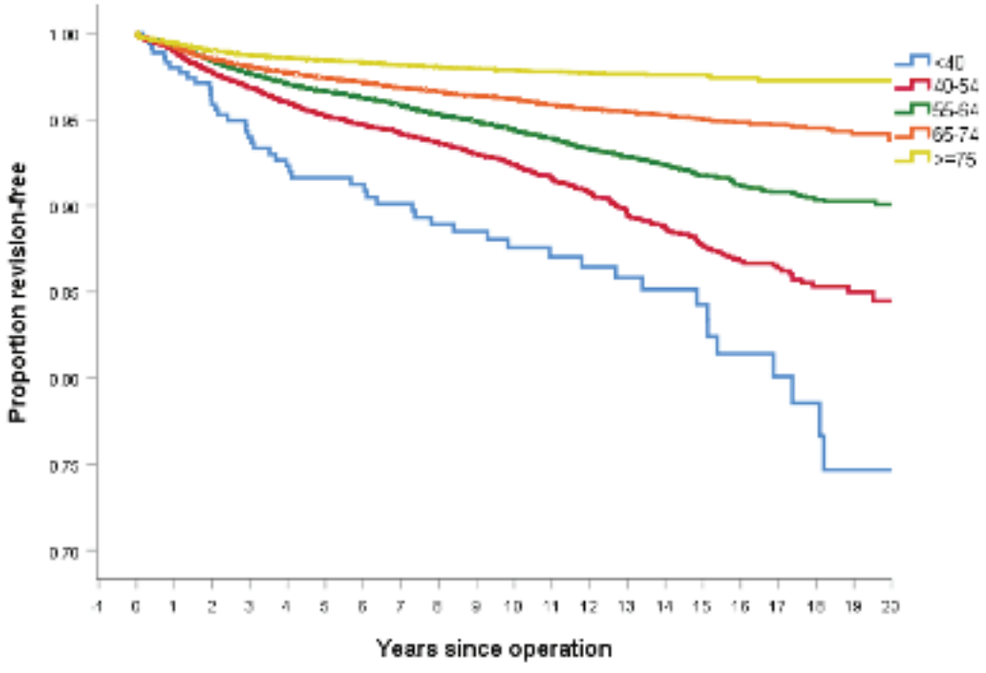
Fixed vs. Mobile knees



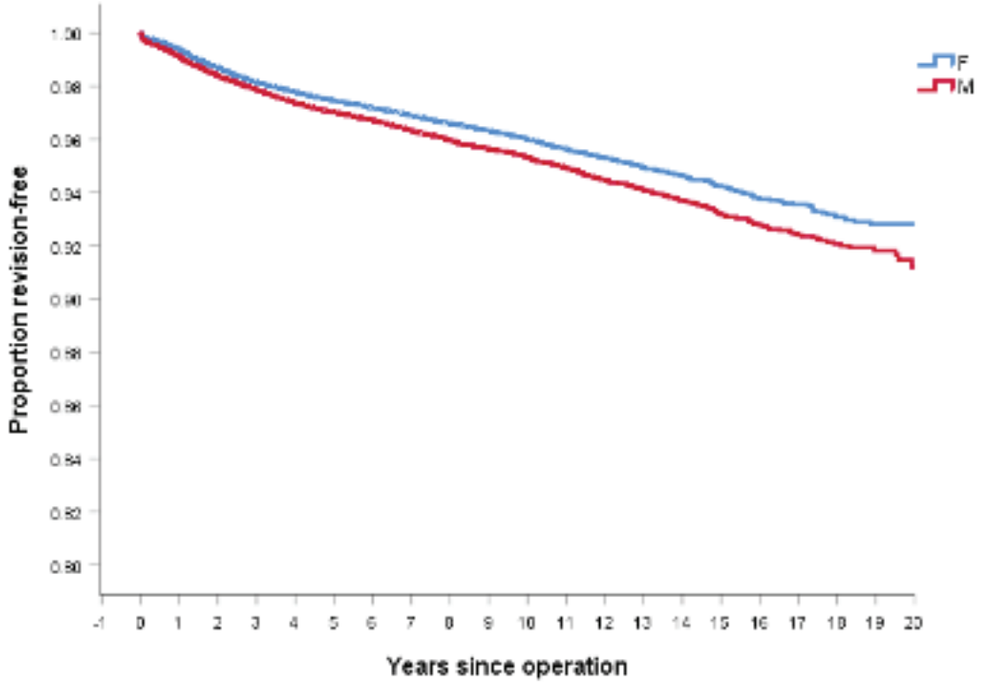
Posterior Stabilised vs. Cruciate Retaining



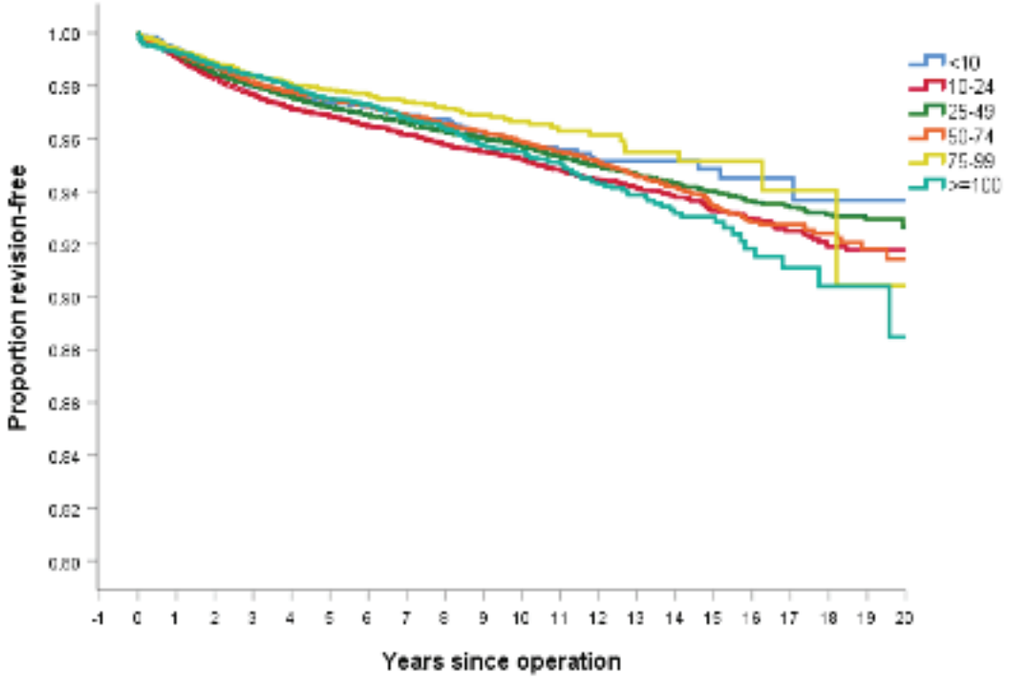
Survival for age bands



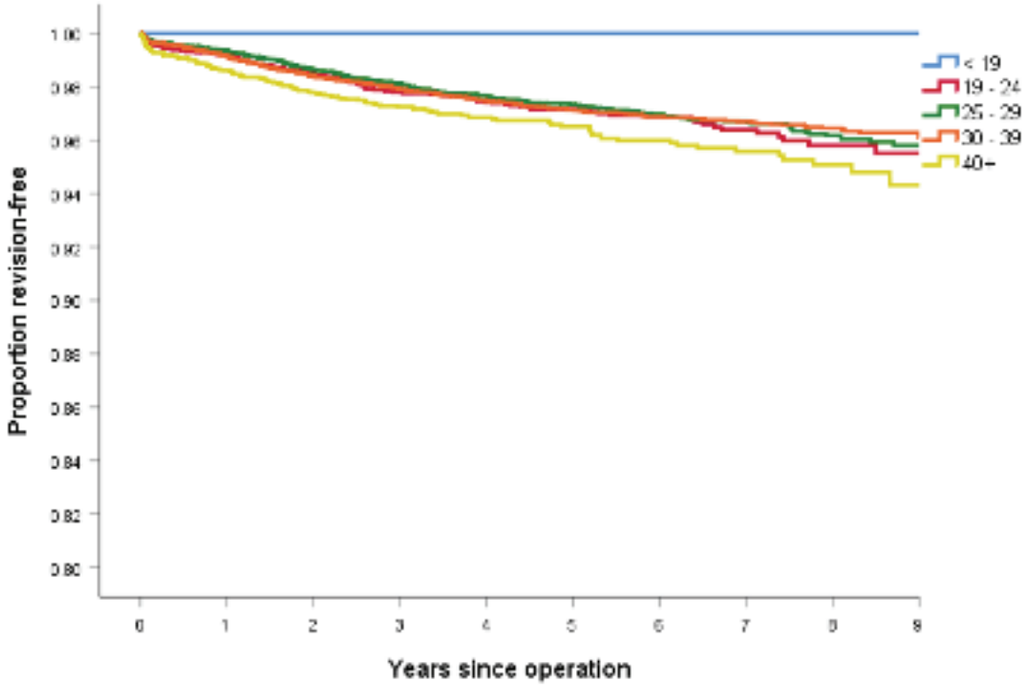
Survival for male vs. female



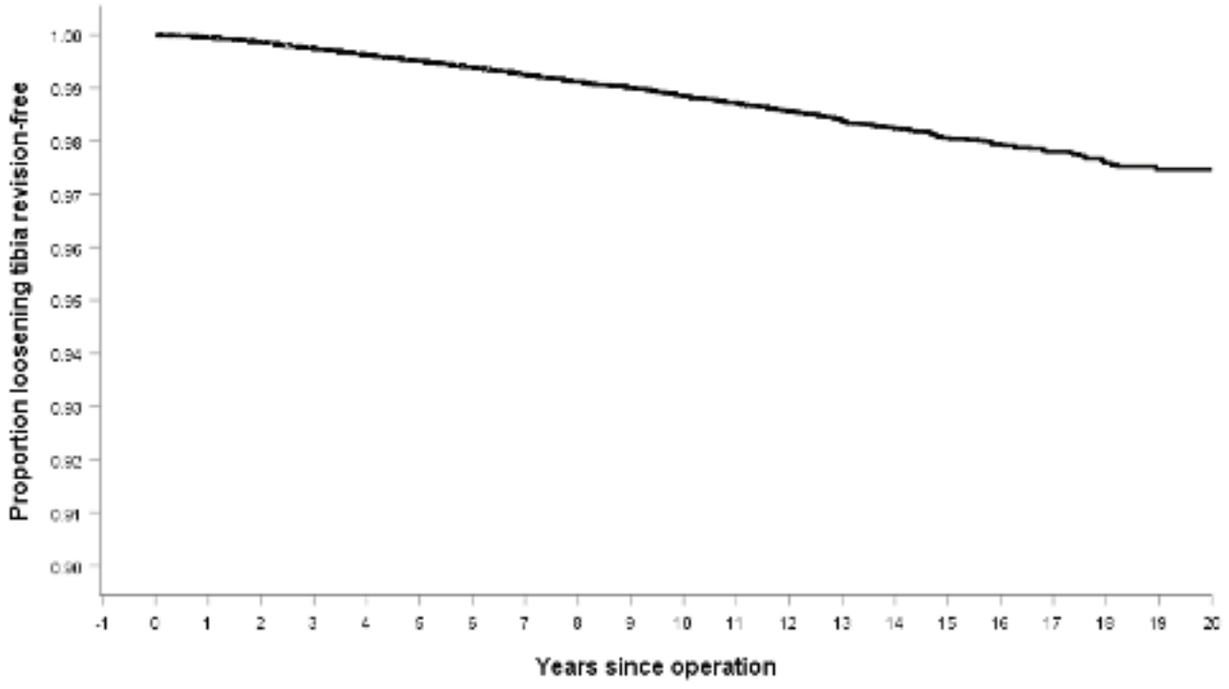
Survival for surgeon annual output



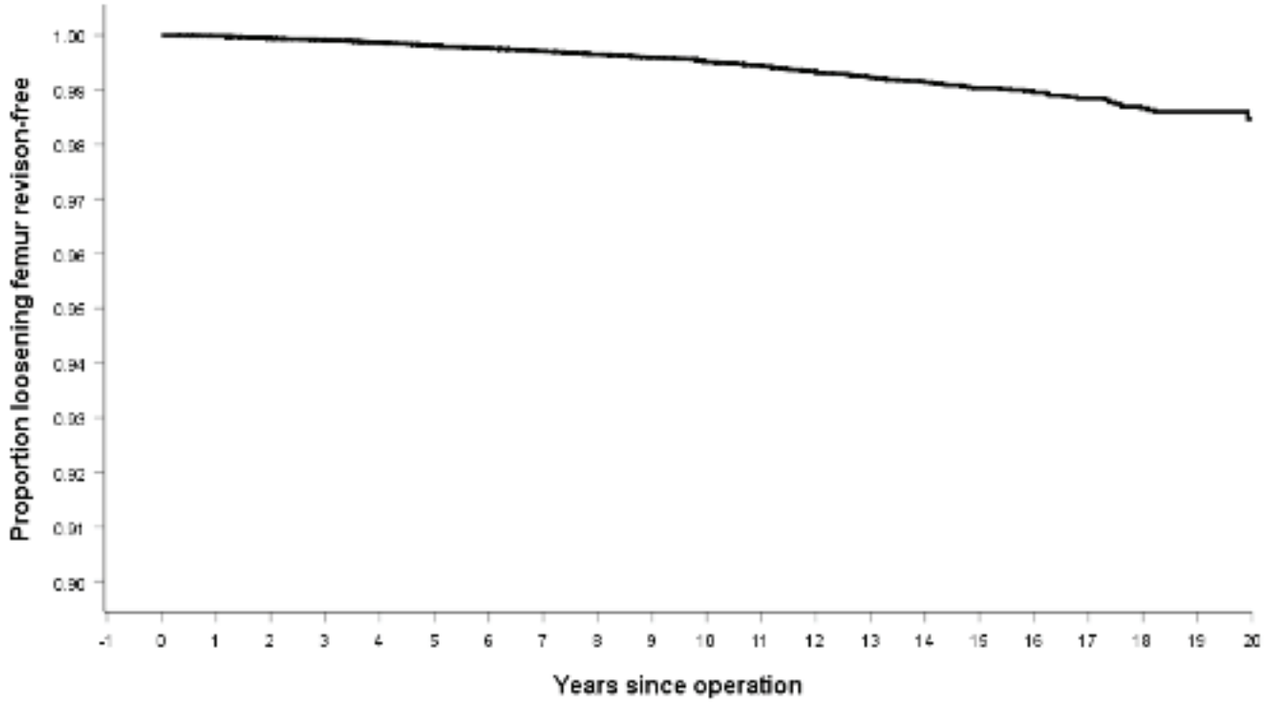
Survival for BMI groups



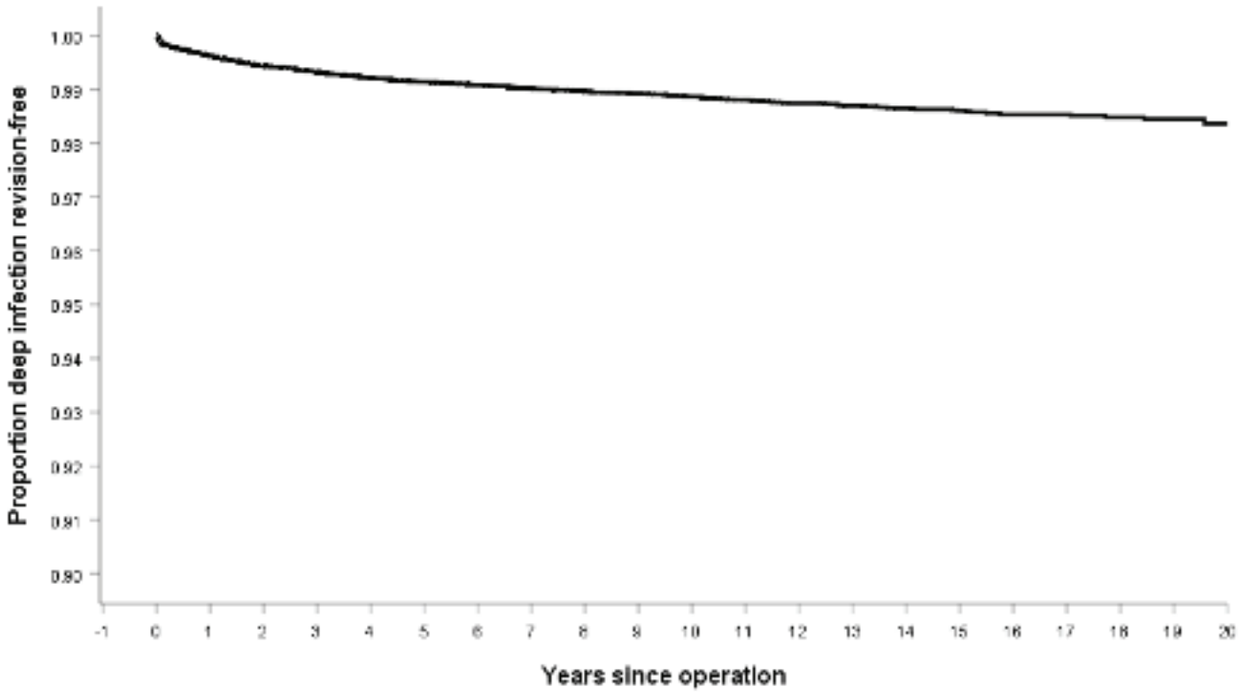
Tibial loosening



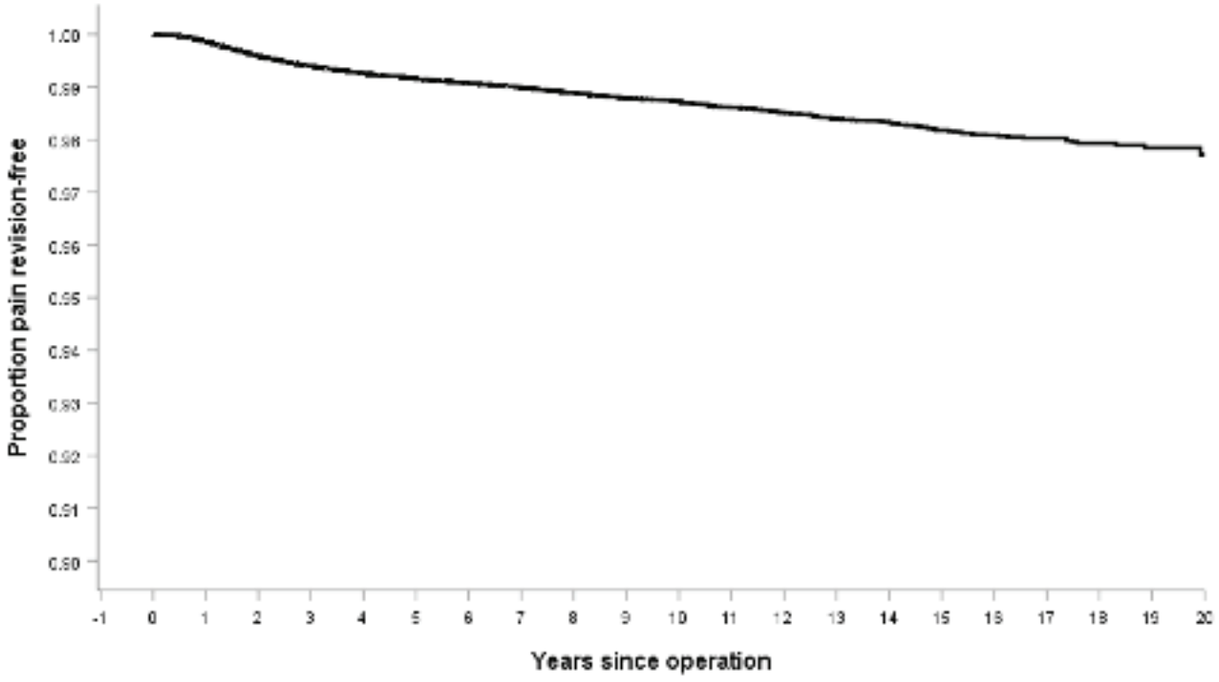
Femoral loosening



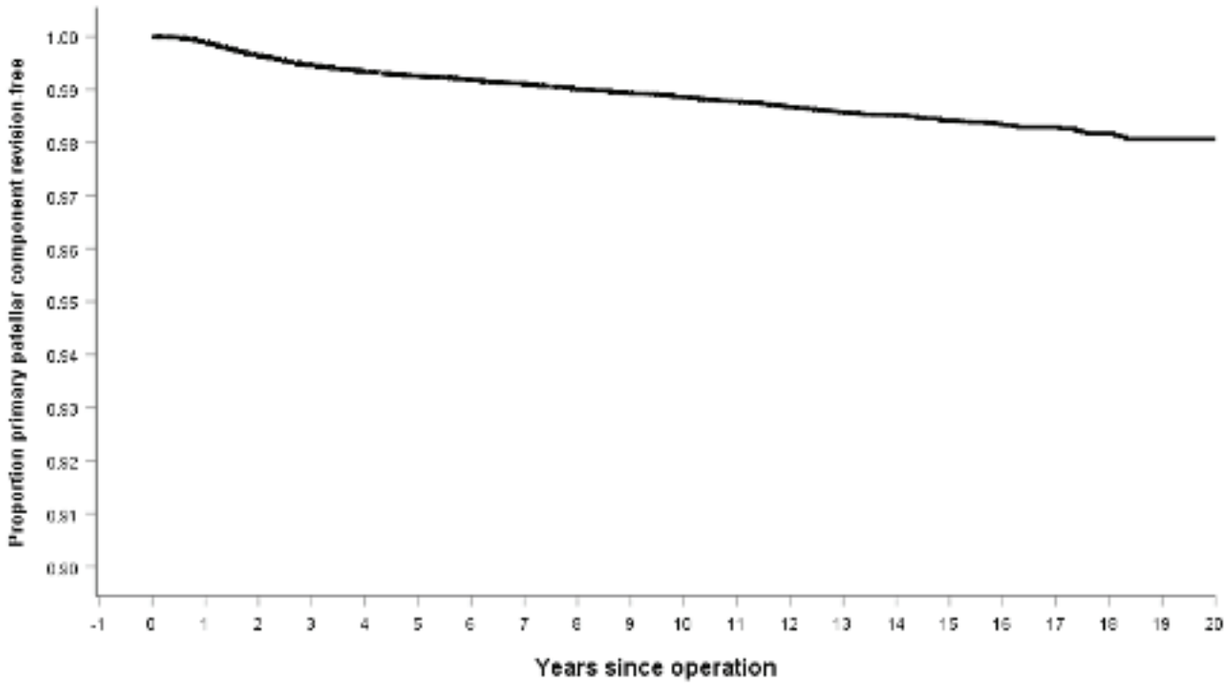
Deep infection

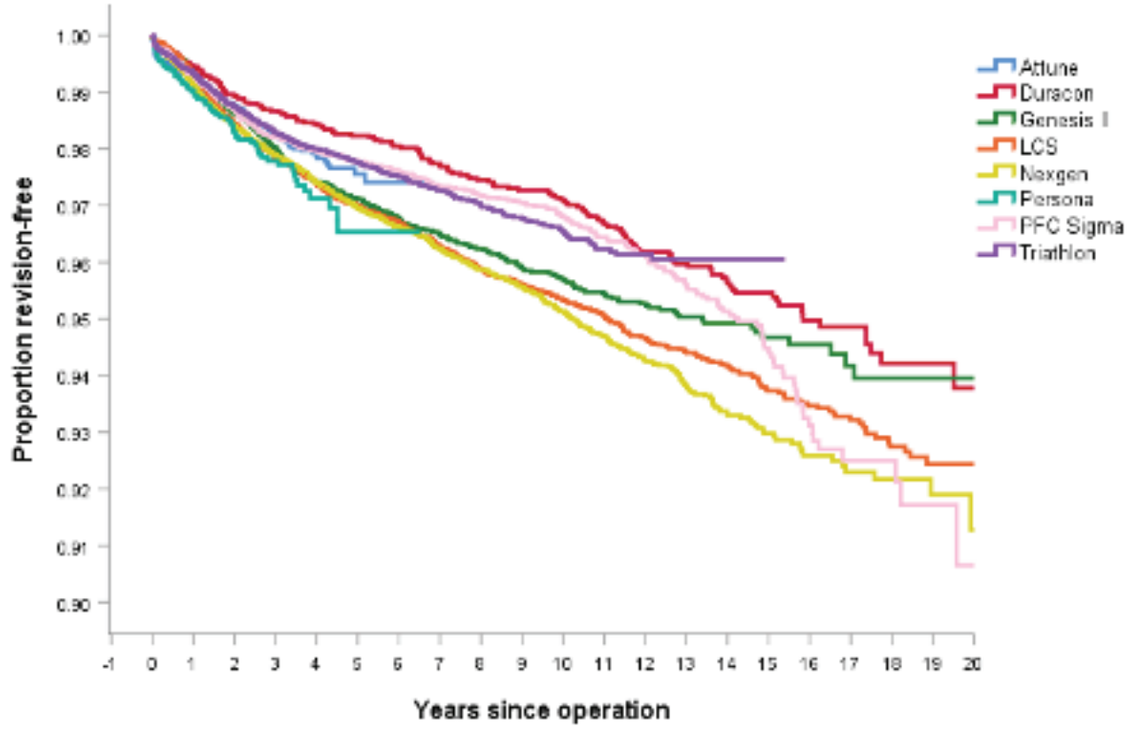


Pain



Patella


Proportion primary 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
-1 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
-1 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 622 registered primary knee revisions that had been revised twice, 139 that had been revised three times, 36 that had been revised four times, 12 that had been revised five times and 4 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 – 6,241 and a standard deviation of 1,047 days. This compares to an average of 1,562 days between primary and first revision knee arthroplasty.

Reason for revision	
Deep infection	316
Pain	125
Loosening tibial component	85
Loosening femoral component	74
Loosening patellar component	10
Fracture femur	4
Fracture tibia	1

Second Revisions

Number of primary revisions	Observed component years	Number of second re-revisions	Rate/100 component-years	Exact 95% confidence interval	
4,024	20,594	622	3.02	2.79	3.27

Third revision

The average time between second and third revisions for the 139 knee arthroplasties was 647 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 36 knee arthroplasties was 686 days, with a range of 10 – 3,419 and a standard deviation of 885 days.

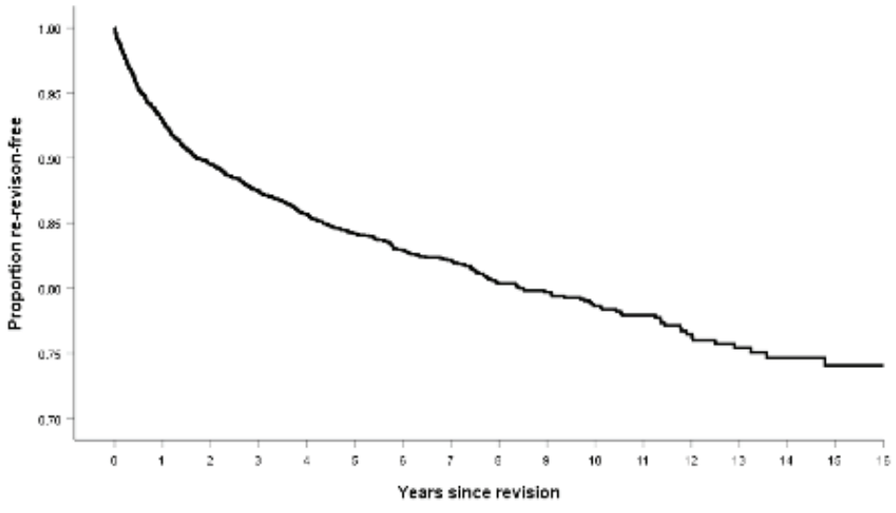
Fifth revision

The average time between fourth and fifth revisions for the 12 knee arthroplasties was 795 days.

Sixth revision

The average time between the fifth and sixth revisions for the 4 knee arthroplasties was 413 days.

KAPLAN MEIER SURVIVAL CURVE FOR FIRST REVISION KNEE ARTHROPLASTIES



Years	Percentage re-revision free	No. in year
1	92.85	3,322
2	89.56	2,863
3	87.46	2,439
4	85.67	2,045
5	84.19	1,688
6	82.92	1,400
7	82.16	1,157
8	80.36	944
9	79.70	780
10	78.64	597
11	77.93	456
12	76.47	320
13	75.41	231
14	74.64	168
15	74.07	122

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-one year period and as at July 2020, there were 30,819 primary knee questionnaire responses registered at six months post-surgery.

The average knee score was 37.67 (standard deviation 8.01, range 48 – 0).

Scoring	> 41	12,087
Scoring	34 – 41	10,904
Scoring	27 – 33	4,602
Scoring	< 27	3,226

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 12,241 individual patients.

At five years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.54.

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 7,265 individual patients.

At ten years post-surgery, 82% of patients achieved an excellent or good score and had an average of 40.06.

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 2,663 individual patients.

At fifteen years post-surgery, 79% of patients achieved an excellent or good score and had an average of 41.45.

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 twenty years post-surgery.

This dataset represents sequential Oxford knee scores for 404 individual patients.

At twenty years post-surgery, 75% of patients achieved an excellent or good score and had an average of 38.23

BMI vs Oxford score at six months

Oxford Score 6M			
BMI	Mean	Standard Error of Mean	Number
< 19	39.63	1.95	16
19 - 24	39.82	0.20	1,183
25 - 29	39.23	0.12	3,446
30 - 39	37.85	0.12	4,241
40+	36.04	0.30	683
Total	**38.46**	**0.08**	**9,569**

Revision knee questionnaire responses

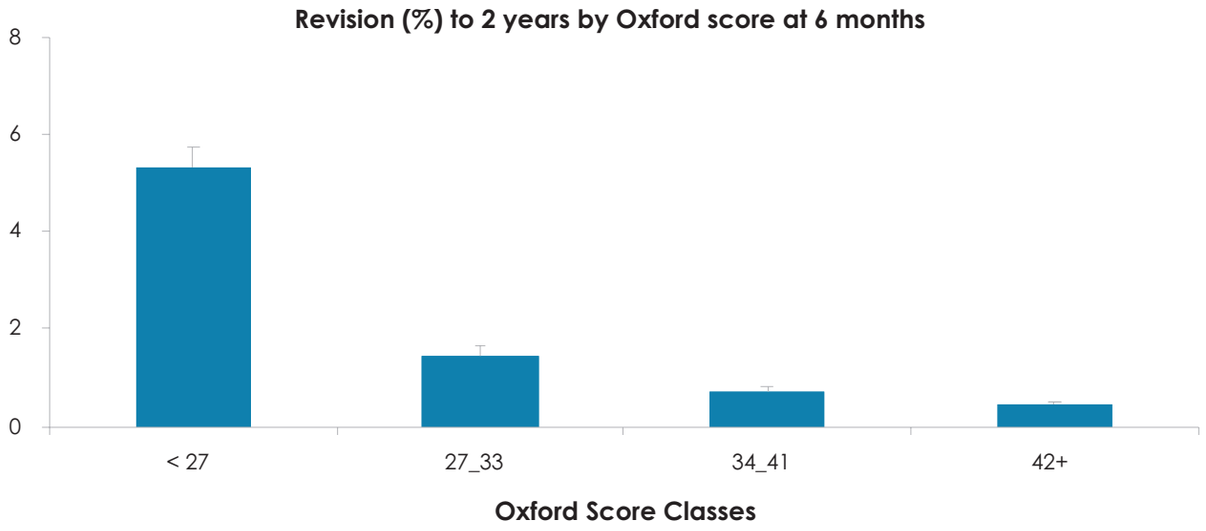
There were 4,982 revision knee responses with 54% achieving an excellent or good score. This group includes all revision knee procedures. The average revision knee score was 32.97 (standard deviation 10.15, range 2 – 48).

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 >42.

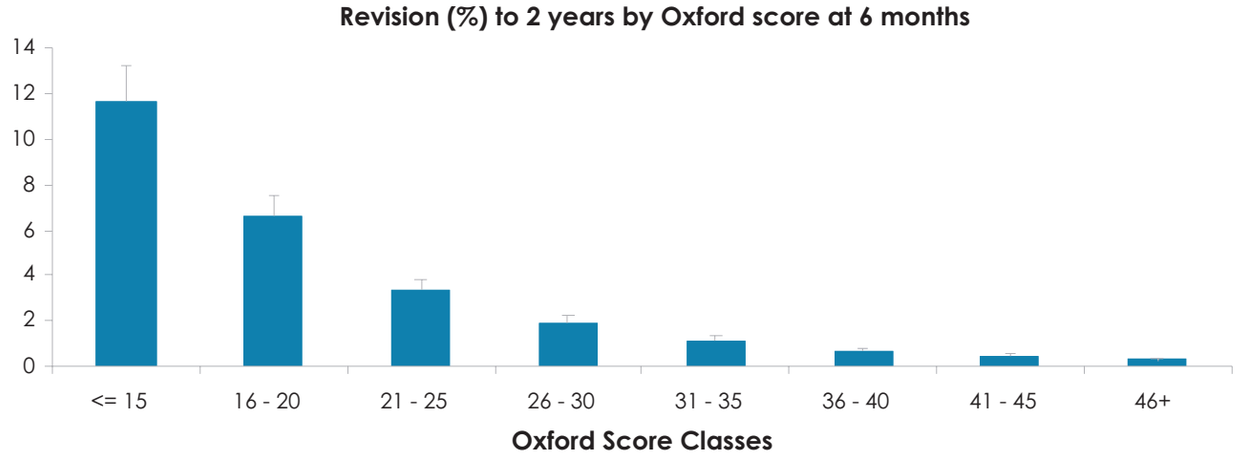


Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	2,900	155	5.34	0.42
27_33	4,154	60	1.44	0.19
34_41	9,765	69	0.71	0.08
42+	10,750	46	0.43	0.06

A person with an Oxford score > 42 has a 0.43 risk of revision within two years compared to a 5.34% risk with a score of 27 or less.

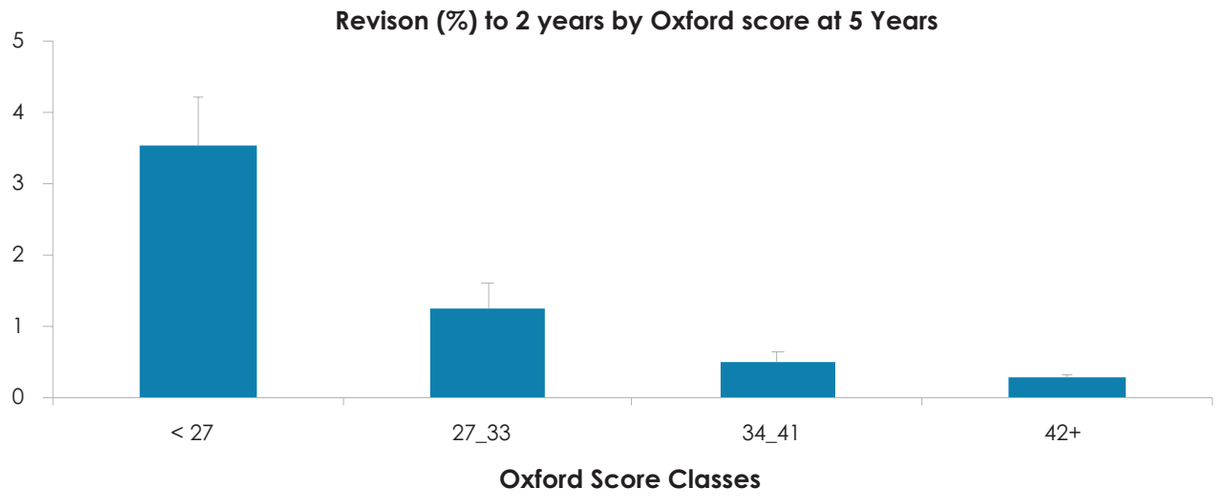
In view of the large number of six month Oxford scores it is possible with statistical significance to further break down the score groupings to demonstrate an even more convincing relationship between score and risk of revision within two years.



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 > 42.



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	708	25	3.53	0.69
27_33	956	12	1.26	0.36
34_41	2,596	13	0.50	0.14
42+	6,187	17	0.27	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 >42.

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

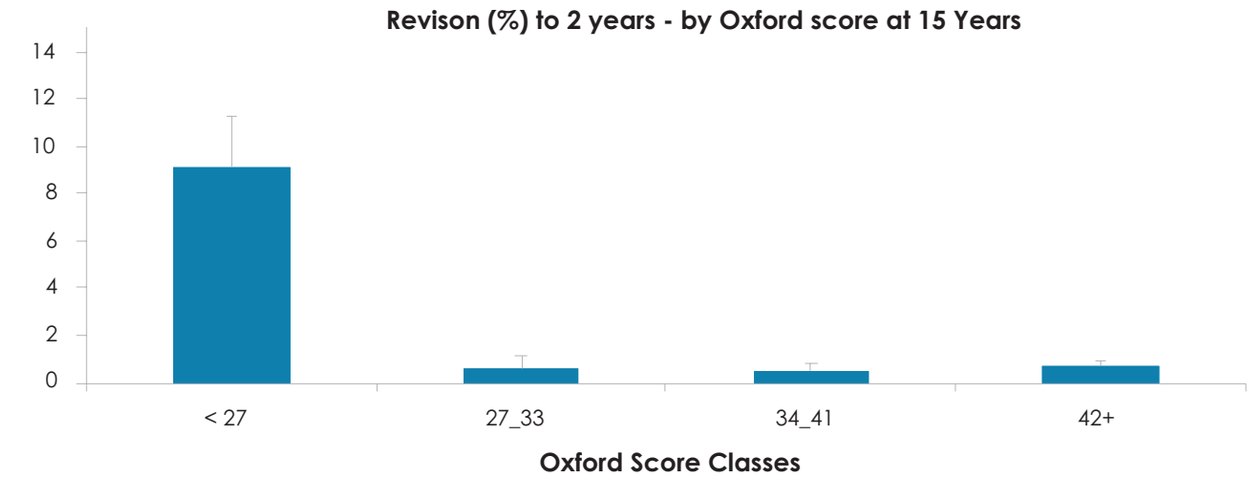
Score group	Revision to 2 years	Number revised	%	Standard error
< 27	396	18	4.55	1.05
27_33	540	12	2.22	0.63
34_41	1,319	6	0.45	0.19
42+	2,936	13	0.44	0.12

A person with an Oxford score of > 42 has a 0.44% risk of revision within two years compared to a 4.55% risk with a score of 27 or less.

Fifteen year score and revision arthroplasty

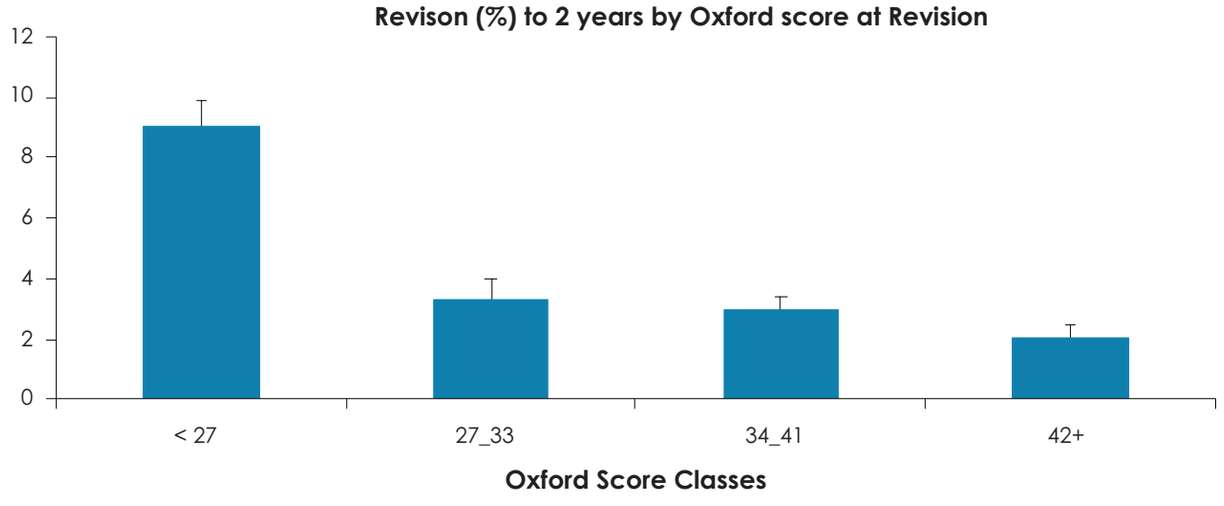
As with the six month, five year and ten year scores, plotting the patients' fifteen year scores in the Kalairajah groupings against the proportion of knees revised for that same group demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 14 times the risk of a revision within two years compared to a person with a score >42.

Score group	Revision to 2 years	Number revised	%	Standard error
< 27	175	16	9.14	2.18
27_33	179	1	0.56	0.56
34_41	415	2	0.48	0.34
42+	921	6	0.65	0.27



Prediction of second revision from six month score following first revision

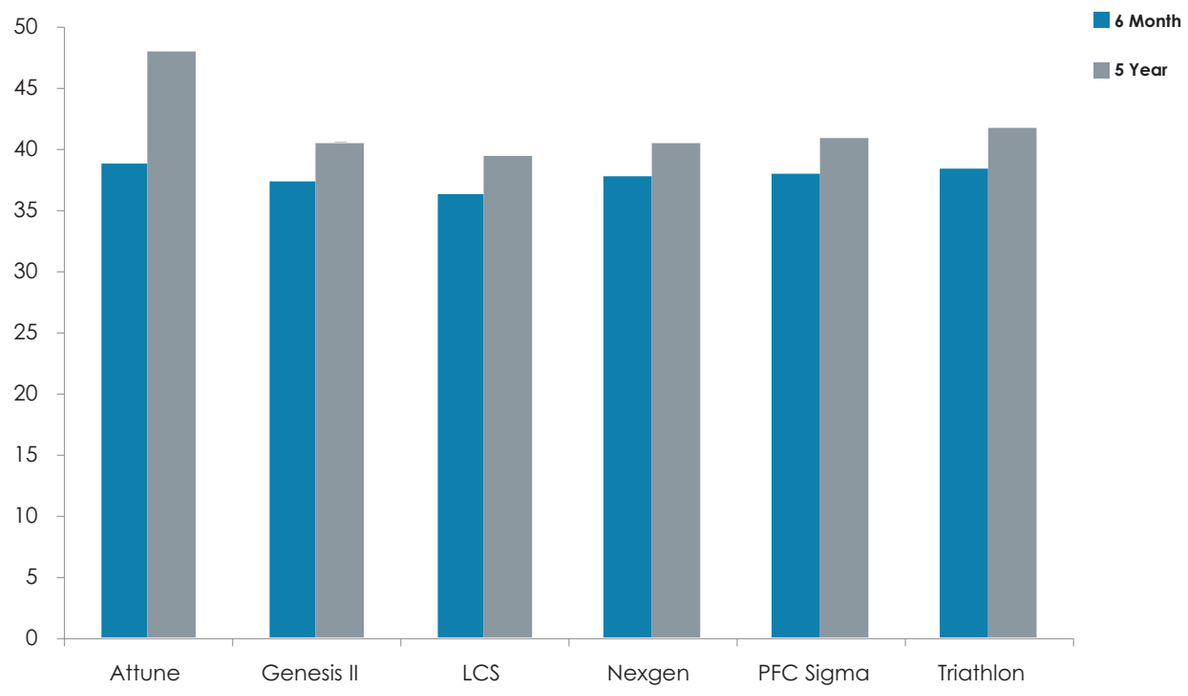
Plotting the patients' six month scores following their first revision in the Kalairajah groupings against the proportion of knees revised for that same group again demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 4 times the risk of a revision within two years compared to a person with a score >42.



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	978	88	9.00	0.92
27_33	749	25	3.34	0.66
34_41	1,159	34	2.93	0.50
42+	974	20	2.05	0.45

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

		Prosthesis					
Oxford Score		Attune	Genesis II	LCS	Nexgen	PFC Sigma	Triathlon
6 Month	Mean	38.9	37.4	36.4	37.9	38.1	38.5
	Std. Error of Mean	0.14	0.14	0.11	0.11	0.14	0.11
	Number	2,700	3,493	5,717	5,072	2963	4705
5 Year	Mean	48.0	40.6	39.5	40.6	41.0	41.8
	Std. Error of Mean		0.18	0.16	0.16	0.18	0.16
	Number	1	1,720	2,559	2437	1605	1875

UNICOMPARTMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **twenty year** report analyses data for the period January 2000 – December 2019. There were 13,680 unicompartmental knee procedures registered with an additional 1,062 for 2019.

For the 2019 year the Oxford uncemented medial UKR remains the most commonly used prosthesis with 658 (62%), followed by the Persona Partial cemented 120 (11%) and Zimmer 115 (11%). Smaller numbers of Restoris 67 (5%), Journey 31, Oxford cemented 40, Sigma 14, Triathlon PKR 7 and Link Sled 2 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	6,241	7,439
Percentage	45.61	54.39
Mean age	65.94	66.28
Maximum age	94.71	94.55
Minimum age	18.28	31.62
Standard dev.	10.14	9.19

Body Mass Index

For the ten year period 2010 - 2019, there were 6,622 BMI registrations for unicompartmental knee replacements. The average was 30.01 with a range of 15 – 59.50 and a standard deviation of 5.03.

Previous operation

None	11,149
Menisectomy	1,966
Ligament reconstruction	82
Osteotomy	49
Internal fixation	37
Synovectomy	5

Diagnosis

Osteoarthritis	13,408
Avascular necrosis	112
Post ligament disruption	64
Rheumatoid arthritis	29
Post fracture	29
Other inflammatory	22
Tumour	2

Approach

Medial	10,293
Minimally invasive surgery	3,190
Lateral	285
Other	220
Image guided surgery	248
Robot assisted	83

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.

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	13,238 (97%)

Operating theatre

Conventional	9,449
Laminar flow	4,090
Space Suits	3,206

ASA Class

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

For the fifteen year period 2005 – 2019, there were 10,764 (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	2,010	19
2	6,887	64
3	1,845	16
4	22	1

Operative time (skin to skin)

Mean	72 minutes

Surgeon grade

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

The following figures are for the fifteen year period 2005 – 2019.

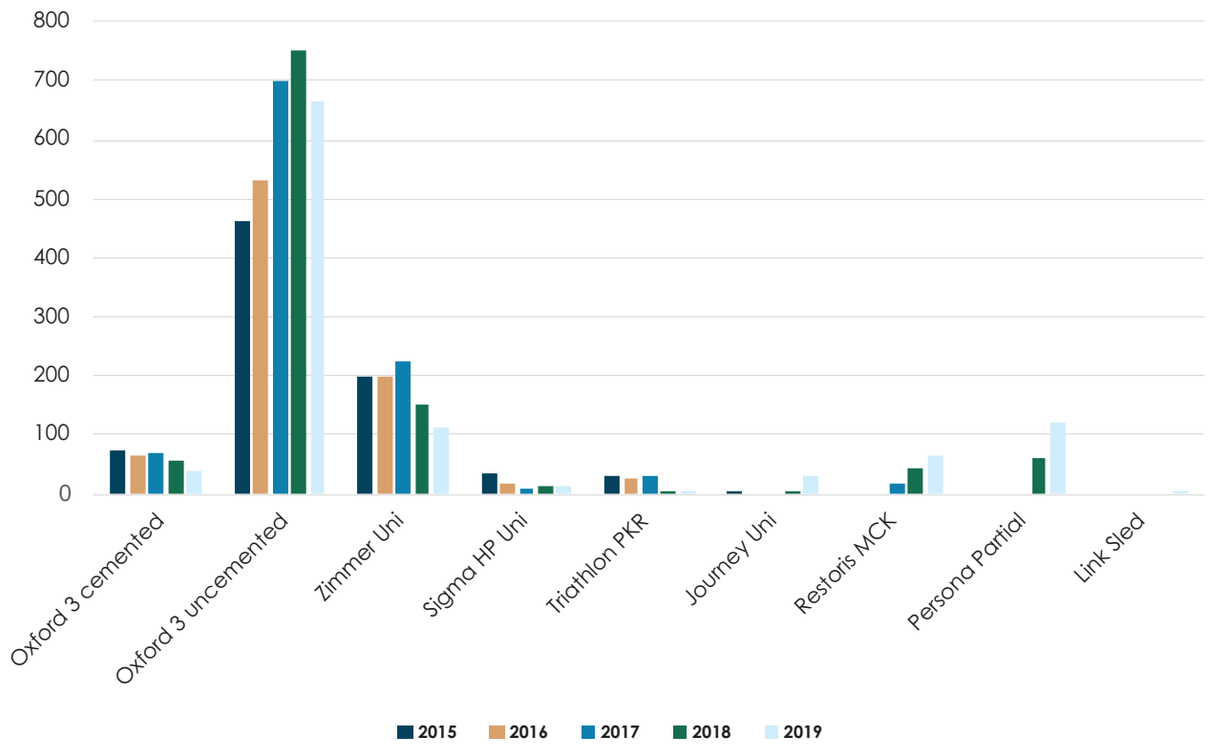
Consultant	10,541
Advanced trainee supervised	488
Advanced trainee unsupervised	682
Basic trainee	16

Prosthesis usage

Unicompartmental knee prostheses used in 2019

Oxford 3 uncemented	665
Persona Partial	120
Zimmer Uni	115
Restoris MCK	67
Oxford 3 cemented	40
Journey Uni	31
Sigma HP Uni	14
Triathlon PKR	7
Link Sled	2

Most used Unicompartmental prostheses for 5 years (2015 – 2019)



Surgeon and hospital workload

Surgeons

In 2019, 91 surgeons performed 1,061 unicompartmental knee replacements, an average of 12 procedures per surgeon.

56 surgeons performed less than 10 procedures and 34 surgeons performed greater or equal to 10 procedures.

Hospitals

In 2019, unicompartmental knee replacements were performed in 39 hospitals; 20 were public and 19 were private.

REVISION OF REGISTERED PRIMARY UNICOMPARTMENTAL ARTHROPLASTIES

This section analyses the data for revision of unicompartmental knee replacement over the twenty 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 1,140 revisions of the 13,698 registered unicompartmental knee replacements (8%). A further 119 had a second revision, 19 a third revision, 1 a fourth revision and 1 a fifth revision.

913 of the 1,140 (80%) were revised to total knee replacements and 227 (20%) were revised to further unicompartmental replacements.

Of the implants that were in common use in 2019, 192 (68 in 2019) medial Oxford UKR were revised (0.75/100 ocys), 40 (11 in 2019), Zimmer UKR (0.53/100 ocys), 12 (3 in 2019), Triathlon PKR (0.97/100 ocys) and 27 (4 in 2019) lateral domed Oxford UKR (1.62/100 ocys).

The observed revision rate remains higher for the more implanted Oxford compared to the Zimmer UKR, with rates having risen marginally for both implants since last year.

Time to revision

Mean	2,133 days
Maximum	6,996 days
Minimum	4 days
Standard deviation	1,753 days

Reason for revision

Pain	341
Loosening tibial component	191
Loosening femoral	136
Deep infection	46
Fracture tibia	28
Fracture femur	5

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	13	9.6	35	18.3	47	13.8
1	22	16.2	36	18.8	73	21.4
2	9	6.6	14	7.3	37	10.9
3	16	11.8	15	7.9	18	5.3
4	5	3.7	10	5.2	31	9.1
5	10	7.4	8	4.2	17	5.0
6	5	3.7	12	6.3	19	5.6
7	11	8.1	9	4.7	16	4.7
8	7	5.1	6	3.1	14	4.1
9	6	4.4	12	6.3	15	4.4
10	8	5.9	6	3.1	15	4.4
11+	24	17.6	28	14.7	39	11.4
Total	**136**		**191**		**341**	

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 component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
13,680	97,203	1,140	1.17	1.11	1.24

Revision Rate of Individual Unicompartmental Knee Prostheses Sorted Alphabetically

	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
EIUS Uni Knee	22	248.8	2	0.80	0.10	2.90
Freedom Active Uni	36	214.5	8	3.73	1.61	7.35
Genesis Uni	358	3,965.8	52	1.31	0.97	1.71
HLS Uni Evolution	1	0.5	1	193.25	4.89	1,076.74
Journey Uni	43	54.0	1	1.85	0.05	10.33
LCS Uni	6	64.0	2	3.12	0.38	11.29
Link Sled	2	0.6	0	0.00	0.00	606.92
Miller/Galante	710	8,495.6	85	1.00	0.80	1.24
Optetrak Unicondylar Cemented	101	914.2	11	1.20	0.60	2.15
Oxford 3 cemented	4,172	42,723.9	595	1.39	1.28	1.51
Oxford 3 uncemented	5,280	23,575.0	192	0.81	0.00	0.94
Oxford TiNbN coated	1	8.5	0	0.00	0.00	43.65
Oxinium Uni	33	298.5	12	4.02	2.08	7.02
Persona Partial cemented	182	138.1	3	2.17	0.45	6.35
Preservation	484	5,386.1	91	1.69	1.35	2.06
Repicci II	98	1,255.1	25			
Restoris MCK	131	141.6	1	0.71	0.00	3.94
Sigma HP Uni	174	807.7	4	0.50	0.13	1.27
Triathlon PKR	239	1,238.3	12	0.97	0.50	1.69
Unix Uni	14	99.4	3	3.02	0.62	8.82
Zimmer Unicompartmental Knee	1,593	7,573.3	40	0.53	0.37	0.71

Oxford 3 uncemented	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Medial Oxford	4,950	21,915.92	165	0.75	0.64	0.88
Lateral Dome Oxford	330	1,666.17	27	1.62	1.07	2.36

Revision vs Arthroplasty Fixation

Fixation	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Cemented	8,304	73,003.1	939	1.29	1.21	1.37
Uncemented	4,792	21,148.0	162	0.77	0.65	0.89
Hybrid	584	3,052.3	39	1.28	0.91	1.75

Revision vs Age Bands

Age Bands	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	1,735	12,572.6	238	1.89	1.66	2.15
55-64	4,648	34,814.4	507	1.46	1.33	1.59
65-74	4,642	33,301.5	283	0.85	0.75	0.95
>=75	2,655	16,515.0	112	0.68	0.56	0.82

Revision vs Gender

Gender	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Female	6,241	45,695.1	580	1.27	1.17	1.38
Male	7,439	51,508.3	560	1.09	1.00	1.18

Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	5,397	42,908.7	594	1.38	1.27	1.50
>=10	8,279	54,281.7	545	1.00	0.92	1.09

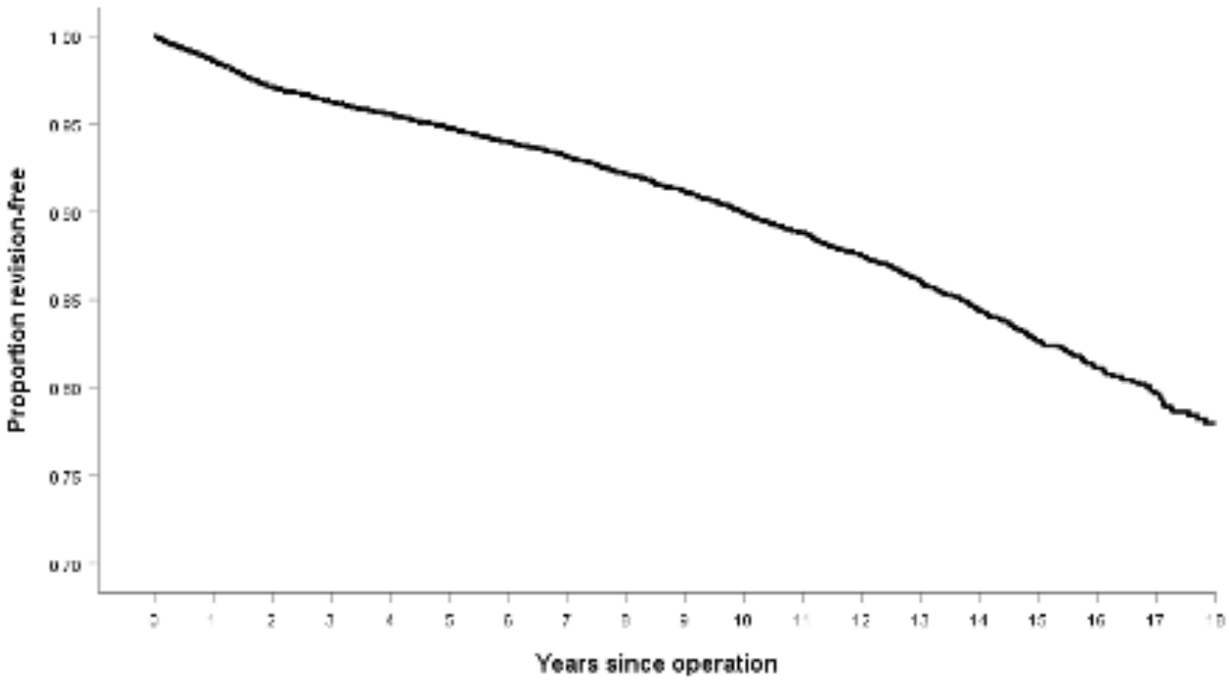
Revision vs Surgical Approach

Approach	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Medial parapatellar	10,286	73,657.7	911	1.24	1.16	1.32
Lateral parapatellar	285	2,140.1	34	1.59	1.10	2.22
Not Minimally Invasive	10,491	74,595.4	929	1.25	1.17	1.33
Minimally Invasive	3,189	22,608.0	211	0.93	0.81	1.07
Not Image guided	13,432	96,449.7	1,133	1.17	1.11	1.25
Image guided	248	753.7	7	0.93	0.00	1.91

KAPLAN MEIER CURVES

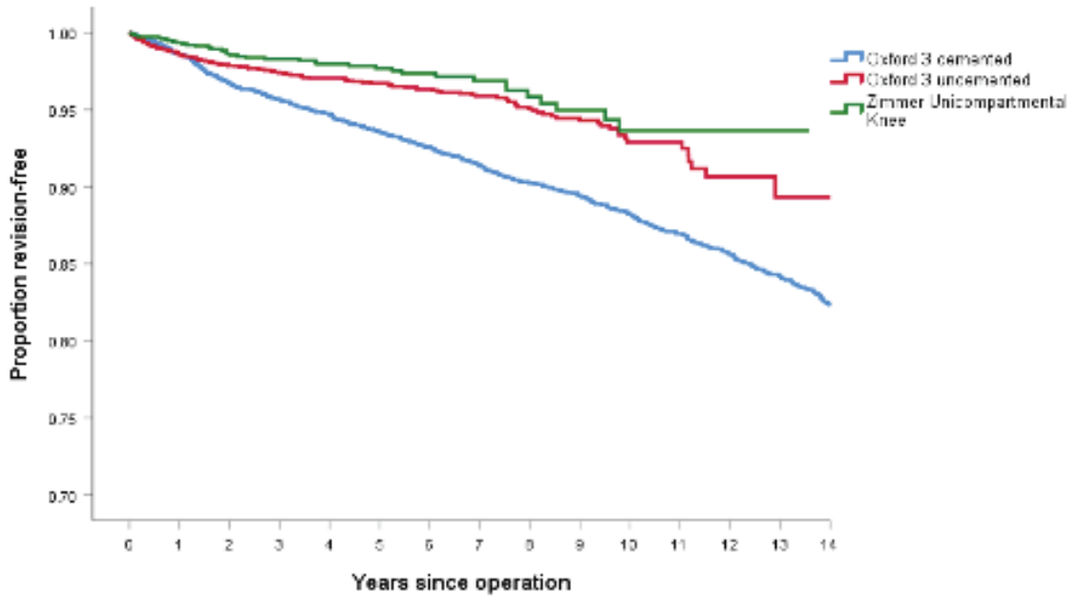
The following Kaplan Meier survival analyses are for the 20 years from 2000 to 2019, with deceased patients censored at time of death.

Unicompartmental Knees



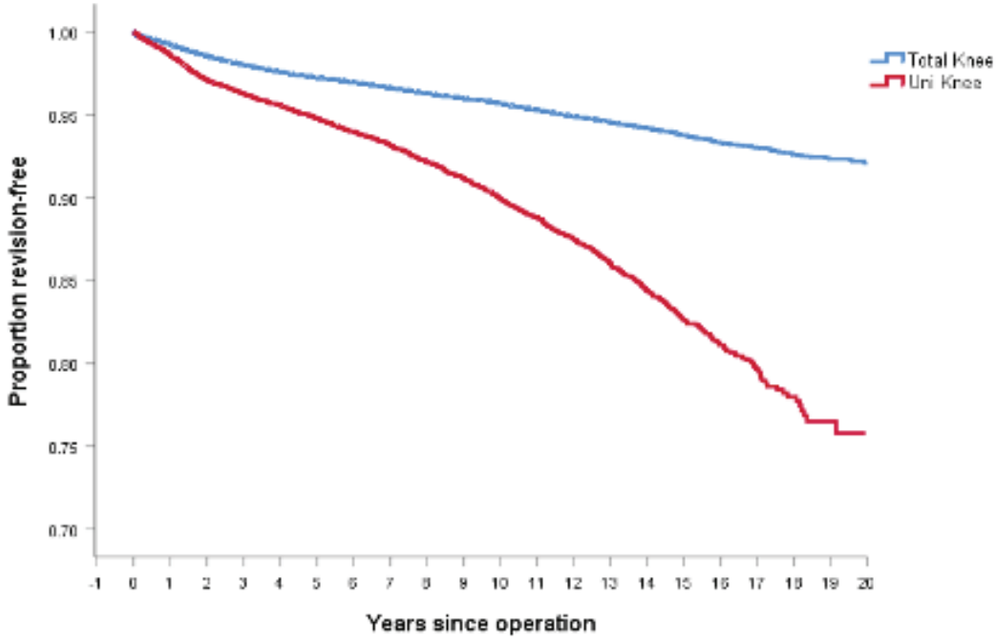
Years	% Revision-free	Number
1	98.6	12,384
2	97.1	11,056
3	96.3	9,821
4	95.6	8,812
5	94.8	7,852
6	94.0	7,013
7	93.2	6,172
8	92.1	5,368
9	91.2	4,686
10	89.9	4,009
11	88.8	3,341
12	87.5	2,811
13	86.0	2,258
14	84.4	1,752
15	82.7	1,319
16	81.1	901
17	79.7	567
18	78.0	303

Survival curves for the 3 unicompartmental knees with the biggest number of implantations excluding lateral domed Oxford 3 uncemented



Revision Rate for Re-revisions

Re-revisions	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Revised to full	913	5,614.2	70	1.25	0.97	1.58
Revised to Uni	227	1013.1	49	4.84	3.58	6.39
All	1,140	6,627.3	119	1.80	1.48	214



	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total Knees	118,430	841,619	4,024	0.48	0.46	0.49
Uni Knees	13,680	97,203	1,140	1.17	1.11	1.24

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 twenty year period and as at July 2020, there were 8,791 unicompartmental knee questionnaire responses registered at six months post-surgery. The average unicompartmental knee score was 39.85 (standard deviation 7.16, range 3 – 48).

Scoring > 41	4,556
Scoring 34 - 41	2,787
Scoring 27- 33	915
Scoring < 27	533

At six months post-surgery, 84% 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 3,552 individual patients.

At five years post-surgery, 88% of patients had achieved an excellent or good score and had an average of 41.72.

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 1,923 individual patients.

At ten years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.84.

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 580 individual patients.

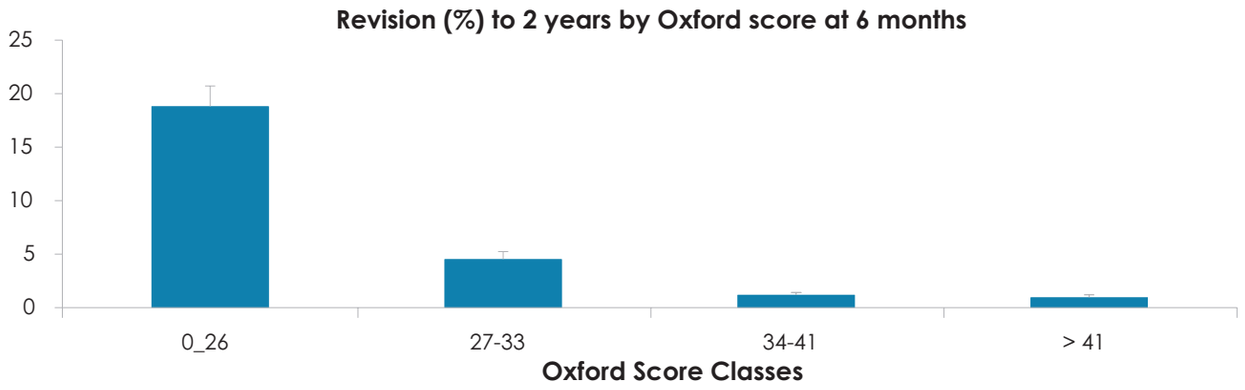
At fifteen years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.30.

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

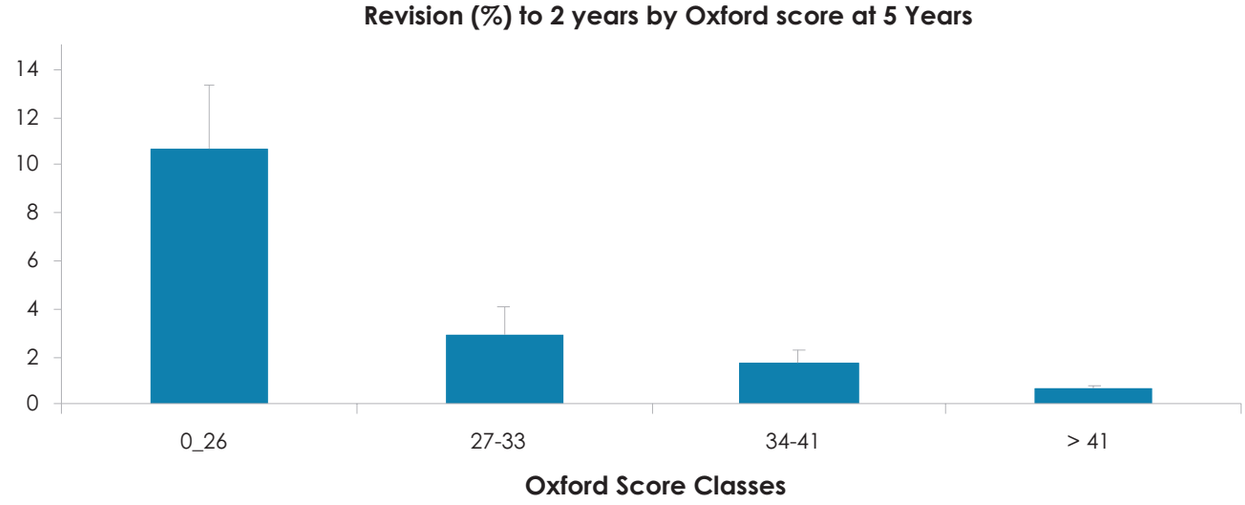


Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date

Kalairajah group	Revision to 2 years	Number revised	%	Standard error
0_26	435	82	18.85	1.88
27-33	767	34	4.43	0.74
34-41	2,269	30	1.32	0.24
> 41	3,657	35	0.96	0.16

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

Kalairajah group	Revision to 2 years	Number revised	%	Standard error
0_26	131	14	10.69	2.70
27-33	206	6	2.91	1.17
34-41	682	12	1.76	0.50
> 41	1,894	12	0.63	0.18

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 10 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 years	Number revised	%	Standard error
0_26	100	14	14.00	3.47
27-33	128	5	3.91	1.71
34-41	315	7	2.22	0.83
> 41	855	12	1.40	0.40

ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **twenty year** report analyses data for the period January 2000 – December 2019. There were 1,737 primary ankle procedures registered.

Data Analysis

Age and sex distribution

The average age for an ankle replacement was 67 years, with a range of 32 – 96 years.

	Female	Male
Number	684	1053
Percentage	39.36	60.64
Mean age	64.36	67.93
Maximum age	95.52	91.78
Minimum age	32.32	33.42
Standard dev.	9.85	8.47

Body Mass Index

For the ten year period 2010 - 2019, there were 713 BMI registrations for primary ankle replacements. The average was 28.55 with a range of 17 – 54 and a standard deviation of 4.59.

Previous operation

None	1,393
Internal fixation for juxta-articular fracture	163
Arthrodesis	47
Osteotomy	24

Diagnosis

Osteoarthritis	1,327
Post old trauma	275
Rheumatoid arthritis	135
Other inflammatory	22
Avascular necrosis	7

Approach

Anterior	1,470
Anterolateral	52
Other	40

Bone graft

Tibia autograft	50
Tibia allograft	3
Tibia synthetic	3
Talus autograft	14
Talus allograft	3

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	1,675 (96%)

Operating theatre

Conventional	867
Laminar flow	855
Space Suits	331

ASA Class

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

For the fifteen year period 2005 -2019, there were 1,464 (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	267
2	904
3	287
4	6

Operative time (skin to skin)

Mean	122 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the fifteen-year period 2005 -2019.

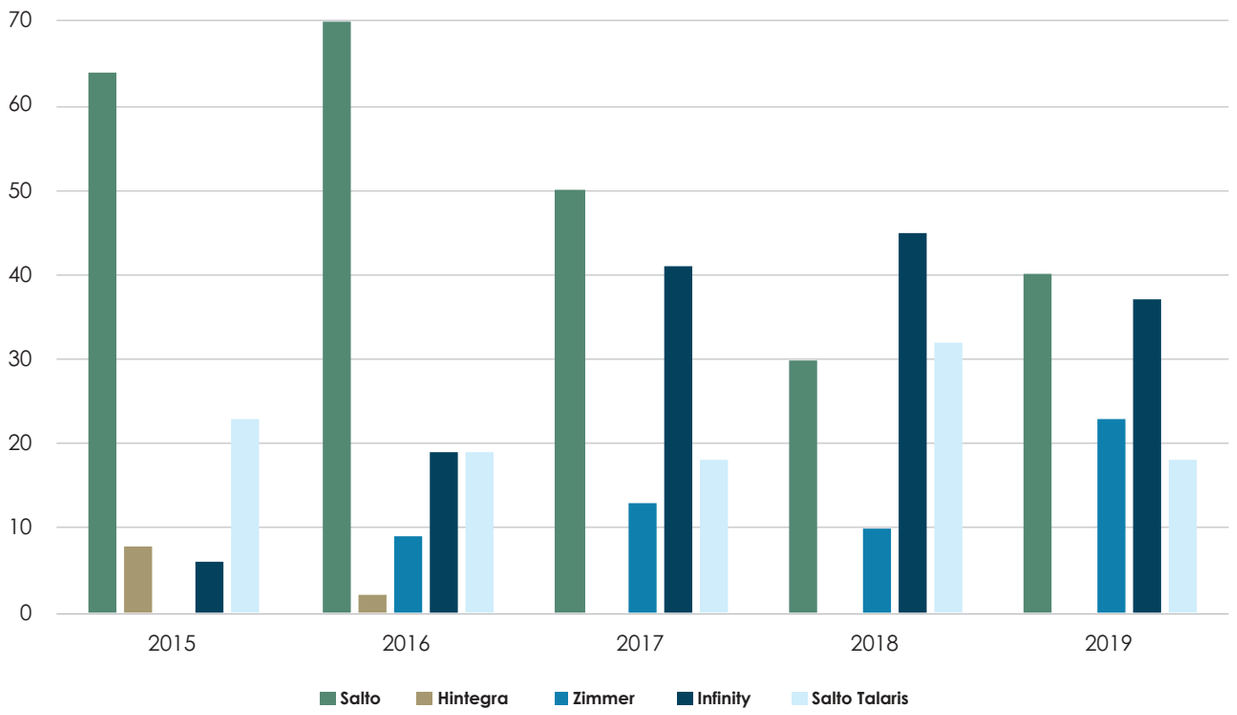
Consultant	1,581
Advanced trainee supervised	13

Prosthesis usage

Ankle prostheses used in 2019

Salto	40
Infinity	37
Zimmer TM	23
Salto Talaris	18

Most Used Ankle Prostheses 2015 – 2019



Surgeon and hospital workload

Surgeons

In 2019, 20 surgeons performed 118 primary ankle procedures. 4 surgeons performed more than 10 procedures and 16 performed <5 procedures.

Hospitals

In 2019, primary ankle replacement was performed in 24 hospitals. 13 were public and 11 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 twenty year period January 2000–December 2019, there were 249 revision ankle procedures registered.

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

	Female	Male
Number	100	149
Percentage	40.16	59.84
Mean	64.01	66.82
Maximum age	81.68	85.43
Minimum age	42.13	34.55
Standard dev.	9.09	8.25

REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

This section analyses data for revisions of primary ankle procedures for the twenty year period 2000 – 2019.

There were 191 revisions of the primary total ankle procedures of 1,737 (11%).

Time to revision

Average	1,689 days
Maximum	5,173 days
Minimum	21 days
Standard deviation	1,246 days

Reason for revision

Pain	82
Loosening talar component	55
Loosening tibial component	42
Deep infection	17
Dislocation	4
Fracture talus	3

Ankle re-revisions

There were 22 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	5.5	3	7.1	4	4.9	8	47.1
1	7	12.7	13	31.0	16	19.5	2	11.8
2	8	14.5	3	7.1	11	13.4	2	11.8
3	8	14.5	3	7.1	10	12.2	2	11.8
4	8	14.5	5	11.9	12	14.6	1	5.9
5	4	7.3	1	2.4	6	7.3	0	0.0
6	3	5.5	3	7.1	5	6.1	0	0.0
7	2	3.6	1	2.4	5	6.1	1	5.9
8	2	3.6	4	9.5	4	4.9	0	0.0
9	4	7.3	2	4.8	3	3.7	0	0.0
10	2	3.6	1	2.4	3	3.7	0	0.0
11+	4	7.3	3	7.1	3	3.7	0	0.0
Total	**55**		**42**		**82**		**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	
1,737	11,326	191	1.69	1.46	1.94

Revision vs Prosthesis Type Sorted in Alphabetical Order

Prosthesis	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Agility	118	1,354.5	35	2.58	1.80	3.59
Box	6	40.5	2	4.94	0.60	17.85
Hintegra	22	112.8	4	3.54	0.97	9.08
Infinity	148	266.3	3	1.13	0.23	3.29
Mobility	450	3,993.4	70	1.75	1.36	2.20
Ramses	11	102.7	5	4.87	1.58	11.36
Salto	761	4,585.8	59	1.29	0.98	1.66
Salto Talaris	116	296.5	0	0.00	0.00	1.24
STAR	47	480.5	12	2.50	1.22	4.23
Zimmer TM	58	92.9	1	1.08	0.00	6.00

Revision vs Gender

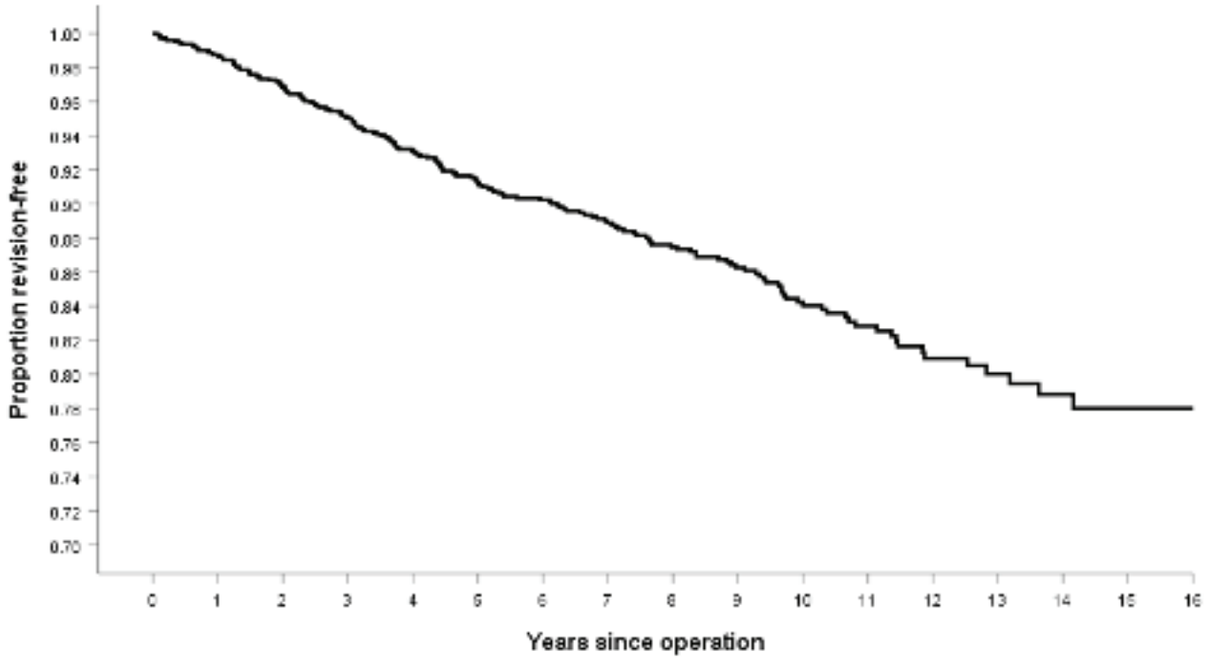
Gender	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	684	4,521.7	78	1.72	1.35	2.14
Males	1,053	6,804.2	113	1.66	1.37	2.00

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	179	1,270.0	37	2.91	2.05	4.02
55-64	531	3,927.6	88	2.24	1.79	2.75
65-74	710	4,492.4	58	1.29	0.98	1.67
>=75	317	1,636.0	8	0.49	0.21	0.96

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 20 years from 2000 to 2019, with deceased patients censored at time of death.



Years	% Revision-free	No in each year
1	98.7	1,584
2	96.9	1,430
3	95.1	1,270
4	93.1	1,114
5	91.3	979
6	90.2	868
7	88.9	743
8	87.5	634
9	86.3	529
10	84.2	414
11	82.8	305
12	80.9	215
13	80.0	160
14	78.8	104
15	78.0	61

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 scores range from 0-64.

For the 3 year period 2016 – 2019 there were 278 responses.

Average = 18.62, Maximum = 60, Minimum = 0 and Standard deviation = 14.54.

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **twenty year** report analyses data for the period January 2000 – December 2019. There were 11,428 primary shoulder procedures registered, with an additional 1,104 registered in 2019.

Of the 11,428 shoulder registrations, 1,854 are hemi shoulder replacements, 3,652 are conventional total shoulder replacements, 5516 are reverse shoulder replacements, 225 are partial resurfacing shoulder replacements, 180 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	7,110	4318
Percentage	62.22	37.78
Mean age	72.65	68.49
Maximum age	97.71	99.36
Minimum age	15.02	20.13
Standard dev.	9.34	10.11

Previous operation

None	9,588
Rotator cuff repair	784
Internal fixation for juxta articular fracture	267
Previous stabilisation	226
Arthroscopic debridement	64
Osteotomy	6
Arthrodesis	2

Approach

Deltopectoral	10,084
Other including deltoid split	285

Bone graft

Humeral autograft	145
Humeral allograft	27
Humeral synthetic	4
Glenoid autograft	213
Glenoid allograft	20
Glenoid synthetic	1

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	10,798 (94%)

Operating theatre

Conventional	6,934
Laminar flow	4,350
Space Suits	1,976

ASA Class

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

For the fifteen year period 2005 – 2019 there were 10,145 (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	849	8
2	5,737	57
3	3,443	34
4	116	2

Operative time (skin to skin in minutes)

	Mean
Hemi Arthroplasty	110
Conventional Total	126
Partial Resurfacing	94
Total Resurfacing	123
Reverse Arthroplasty	111

Surgeon grade

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

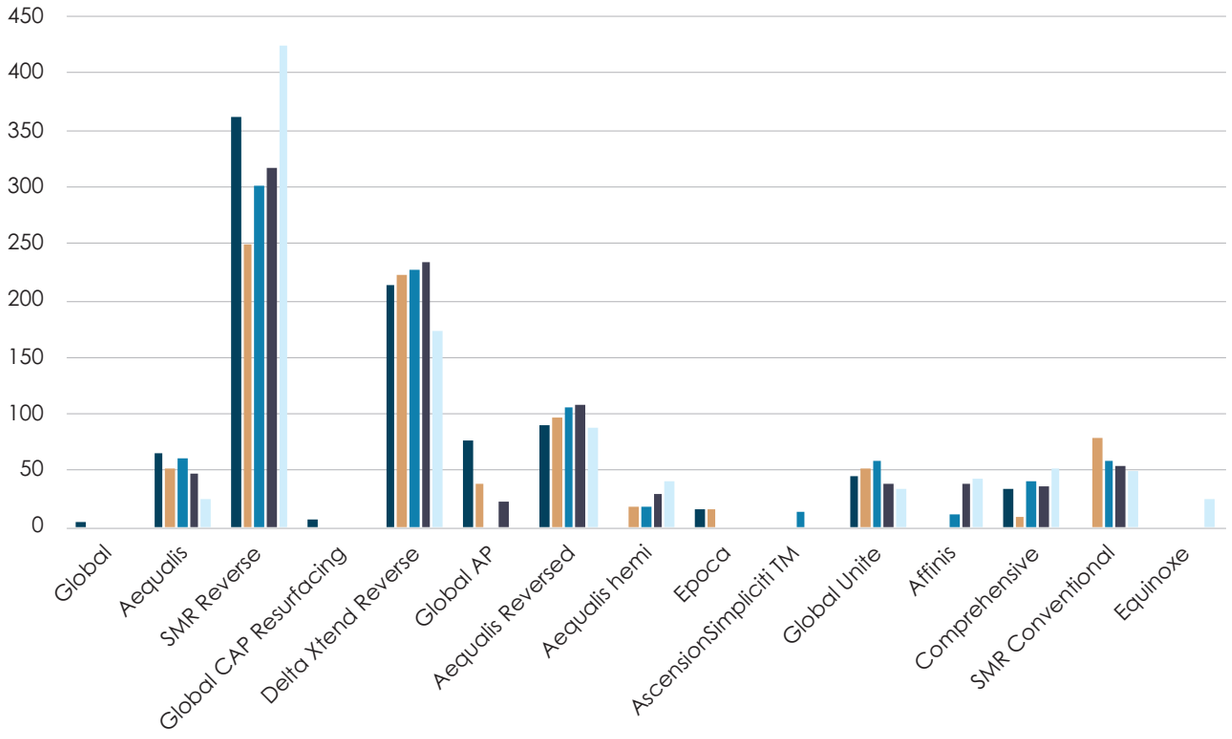
The following figures are for the fifteen-year period 2005 – 2019.

Consultant	9,969
Advanced trainee supervised	509
Advanced trainee unsupervised	24
Basic trainee	5

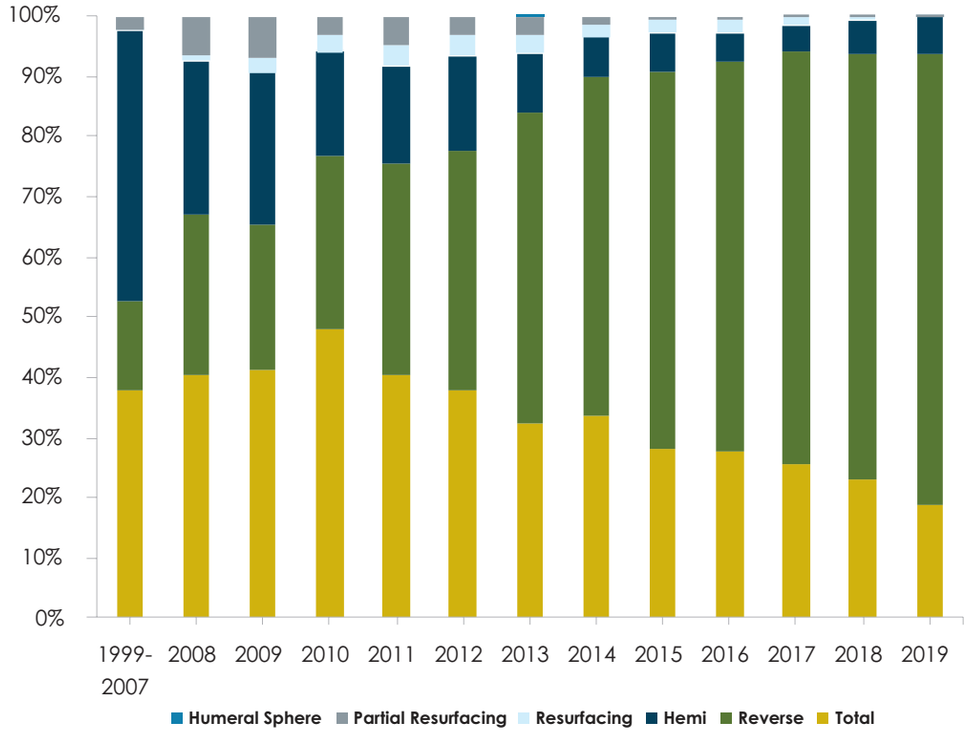
Top 10 shoulder prostheses 2019

SSMR reverse	424
Delta Xtend reverse	174
Aequalis reverse	87
Comprehensive	53
SMR conventional	50
Affinis	44
Aequalis hemi	41
Global Unite	34
Equinoxe Reverse	26
Aequalis	25

Most used shoulder prostheses for five years 2015 – 2019



Percentages of the different types of shoulder prostheses used by year



Surgeon and hospital workload

Surgeons

In 2019, 71 surgeons performed 1,104 shoulder procedures; an average of 16 procedures per surgeon. 20 surgeons performed more than 20 procedures and 4 surgeons each performed 1 procedure.

Hospitals

In 2019, shoulder replacement was performed in 48 hospitals. 26 were public and 22 were private.

For 2019, the average number of shoulder replacements per hospital was 23.

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 twenty year period January 2000 – December 2019 there were 911 revision shoulder procedures registered, an increase of 94 in the last year.

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

	Female	Male
Number	527	384
Percentage	57.85	42.15
Mean	70.11	67.11
Maximum age	89.95	88.46
Minimum age	33.20	24.05
Standard dev.	10.09	10.25

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

This section analyses data for revisions of primary shoulder procedures for the twenty year period January 2000 – December 2019.

There were 593 revisions of the primary group of 11,428 (5%). There were 78 procedures that had been revised twice, 18 that had been revised three times and 4 revised 4 times.

Time to revision

Average	1,217 days
Maximum	6,607 days
Minimum	0 days
Standard deviation	1,240 days

Reason for revision

Pain	123
Loosening glenoid	92
Sub acromial cuff impingement	90
Dislocation	84
Deep infection	53
Loosening humeral	27
Instability posterior	17
Fracture humerus	13
Loosening both	9
Sub acromial tuberosity	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	
Year	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
0	20	21.7	51	60.7	18	34.0	23	18.7	21	23.3	6	22.2
1	16	17.4	13	15.5	14	26.4	27	22.0	23	25.6	3	11.1
2	9	9.8	3	3.6	6	11.3	20	16.3	14	15.6	4	14.8
3	5	5.4	2	2.4	6	11.3	9	7.3	4	4.4	3	11.1
4	4	4.3	4	4.8	4	7.5	11	8.9	6	6.7	2	7.4
5	5	5.4	5	6.0	2	3.8	6	4.9	7	7.8	3	11.1
6	3	3.3	1	1.2	1	1.9	4	3.3	2	2.2	0	0.0
7	2	2.2	2	2.4	1	1.9	7	5.7	4	4.4	0	0.0
8	2	2.2	2	2.4	0	0.0	3	2.4	2	2.2	1	3.7
9	10	10.9	0	0.0	0	0.0	4	3.3	2	2.2	3	11.1
10	5	5.4	0	0.0	0	0.0	2	1.6	3	3.3	1	3.7
11+	11	12.0	1	1.2	1	1.9	7	5.7	2	2.2	1	3.7
Total	**92**		**84**		**53**		**123**		**90**		**27**	

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 component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
11,428	62,988	593	0.94	0.87	1.02

Revision rate of Shoulder Prostheses vs Arthroplasty Type

Operation Type	No. Ops.	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Total	3,652	23,858.2	225	0.94	0.82	1.07
Reverse	5,516	21,398.9	159	0.74	0.63	0.87
Hemi	1,854	14,844.4	166	1.12	0.95	1.30
Resurfacing	180	1,080.2	5	0.46	0.15	1.08
Partial resurfacing	225	1,800.2	38	2.11	1.47	2.87
Humeral Sphere	1	6.1	0	0.00	0.00	60.77

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	601	3,619.9	19	0.52	0.31	0.80
	Affinis	119	200.8	1	0.50	0.01	2.78
	Anatomical	34	463.8	2	0.43	0.05	1.56
	Arthrex Eclipse	12	16.4	0	0.00	0.00	22.49
	Arthrex Univers	2	0.3	0	0.00	0.00	1,104.40
	Ascend TM	2	11.4	0	0.00	0.00	32.38
	Bi-Angular	6	52.7	0	0.00	0.00	7.00
	Bigliani/Flatow	305	2,919.2	10	0.34	0.16	0.63
	Cofield 2	21	248.6	0	0.00	0.00	1.48
	Comprehensive	50	133.8	2	1.50	0.18	5.40
	Delta Xtend Reverse	1	5.7	0	0.00	0.00	64.87
	Epoca Humeral stem	4	35.0	0	0.00	0.00	10.53
	Equinoxe Humeral	7	6.8	0	0.00	0.00	54.26
	Global	519	4,967.0	26	0.52	0.34	0.77
	Global AP	515	3,011.5	10	0.33	0.16	0.61
	Global Icon	9	8.0	0	0.00	0.00	46.02
	Global Unite	214	597.1	6	1.00	0.37	2.19
	Humeral stem	1	7.3	0	0.00	0.00	50.24
	Neer 3	2	29.4	0	0.00	0.00	12.54

Operation Type	Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
	Neer II	12	159.7	1	0.63	0.02	3.49
	Osteonics humeral component	49	531.3	6	1.13	0.41	2.46
	Sidus	1	5.3	0	0.00	0.00	69.27
	Simpliciti TM	62	139.1	1	0.72	0.02	4.00
	SMR	1092	6,655.4	141	2.12	1.78	2.49
	Stanard PTC Humeral Stem	2	0.5	0	0.00	0.00	680.49
	Univers 3D	4	27.3	0	0.00	0.00	13.49
	Univers Apex	4	3.6	0	0.00	0.00	102.00
	Univers II	1	0.8	0	0.00	0.00	481.20
Reverse	Aequalis	409	1,108.7	11	0.99	0.50	1.78
	Aequalis Reversed	186	686.1	7	1.02	0.41	2.10
	Aequalis Reversed Fracture	50	167.0	0	0.00	0.00	2.21
	Affinis	33	68.0	2	2.94	0.36	10.62
	Arthrex Univers	4	0.7	0	0.00	0.00	549.94
	Arthrex Univers Revers	37	27.6	0	0.00	0.00	13.35
	Comprehensive	203	454.9	2	0.44	0.02	1.59
	Delta	55	514.2	2	0.39	0.05	1.41
	Delta Xtend Reverse	1,810	7,370.2	68	0.92	0.71	1.16
	Equinoxe Humeral	41	25.2	1	3.97	0.10	22.12
	Equinoxe Preserve	1	0.2	0	0.00	0.00	1,480.62
	Global Unite	21	20.6	0	0.00	0.00	17.89
	Mutars	1	1.6	0	0.00	0.00	237.21
	RSP	2	4.8	0	0.00	0.00	76.17
	SMR	2,613	10,754.6	64	0.60	0.46	0.76
	Stanard PTC Humeral Stem	1	0.4	0	0.00	0.00	847.40
	Trabecular Metal Reverse	46	184.4	2	1.08	0.13	3.92
	Vaios	1	8.7	0	0.00	0.00	42.41
	Zimmer Trabecular Metal Should	1	0.7	0	0.00	0.00	522.23

Operation Type	Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Hemi	Aequalis	280	1,584.0	16	1.01	0.55	1.60
	Aequalis Reversed	1	2.4	0	0.00	0.00	153.46
	Affinis	14	36.7	1	2.72	0.07	15.17
	Anatomical	19	255.0	0	0.00	0.00	1.45
	Arthrex Eclipse	3	23.3	0	0.00	0.00	15.84
	Ascend TM	1	6.9	0	0.00	0.00	53.62
	Bi-Angular	19	224.7	2	0.89	0.11	3.21
	Bigliani/Flatow	136	1,396.2	15	1.07	0.60	1.77
	Bio-modular	1	7.1	1	14.00	0.35	78.03
	Cofield 2	50	601.5	1	0.17	0.00	0.93
	Comprehensive	3	7.2	0	0.00	0.00	50.88
	Delta	1	8.8	0	0.00	0.00	42.08
	Delta Xtend Reverse	30	122.0	4	3.28	0.89	8.39
	Global	722	6,817.8	60	0.88	0.67	1.13
	Global AP	92	530.0	5	0.94	0.25	2.07
	Global Icon	1	1.8	0	0.00	0.00	202.61
	Global Unite	64	213.1	12	5.63	2.91	9.84
	MRS Humeral	4	19.9	0	0.00	0.00	18.50
	Neer II	23	238.6	0	0.00	0.00	1.55
	Osteonics humeral component	43	411.9	2	0.49	0.06	1.75
	Randelli	1	8.2	0	0.00	0.00	44.82
	Simpliciti TM	2	5.3	0	0.00	0.00	69.67
	SMR	342	2,317.9	47	2.03	1.49	2.70
	Stanard PTC Humeral Stem	1	0.2	0	0.00	0.00	2,363.80
	Univers 3D	1	3.8	0	0.00	0.00	96.59
Total Resurfacing	Aequalis Resurfacing Head	10	80.8	0	0.00	0.00	4.57
	Arthrex Eclipse	1	1.2	0	0.00	0.00	314.80
	Epoca Head	103	571.4	4	0.70	0.15	1.66
	Global CAP Resurfacing	62	404.1	1	0.25	0.01	1.38
	Hemicap Resurfacing	1	3.7	0	0.00	0.00	98.85
	SMR Resurfacing	3	19.1	0	0.00	0.00	19.33

Operation Type	Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Partial resurfacing	Aequalis Resurfacing Head	1	3.0	0	0.00	0.00	121.06
	Arthrex Eclipse	3	12.9	2	15.47	1.87	55.87
	Ascension	20	137.7	2	1.45	0.08	5.25
	Copeland Resurfacing	19	180.0	4	2.22	0.61	5.69
	Custom Global Cap	1	7.5	1	13.41	0.34	74.74
	Epoca Head	21	126.8	2	1.58	0.19	5.70
	Global AP CTA Humeral Head	2	0.7	1	145.52	3.68	810.77
	Global Cap CTA	1	1.5	0	0.00	0.00	238.89
	Global CAP Resurfacing	96	880.7	14	1.59	0.87	2.67
	Global Humeral Head	1	7.2	0	0.00	0.00	50.98
	Hemicap Resurfacing	8	65.0	1	1.54	0.04	8.57
	SMR Resurfacing	45	329.9	9	2.73	1.25	5.18
	SMR Resurfacing CTA	7	47.0	2	4.25	0.52	15.37

Revision vs Glenoid Fixation

(Conventional Total arthroplasties only)

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Uncemented	1,018	6,733.7	134	1.99	1.66	2.35
Cemented	2,634	17,124.5	91	0.53	0.43	0.65

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	250	1,375.6	30	2.18	1.44	3.07
	55-64	910	5,814.5	83	1.43	1.14	1.77
	65-74	1,592	10,757.7	84	0.78	0.62	0.96
	>=75	900	5,910.4	28	0.47	0.31	0.67
Reverse	<55	75	192.2	3	1.56	0.32	4.56
	55-64	623	2,304.4	32	1.39	0.93	1.93
	65-74	2,116	8,317.9	69	0.83	0.65	1.05
	>=75	2,702	10,584.4	55	0.52	0.39	0.68
Hemi	<55	256	1,973.8	33	1.67	1.13	2.32
	55-64	389	3,236.6	61	1.88	1.44	2.42
	65-74	554	4,859.3	46	0.95	0.69	1.26
	>=75	655	4,774.7	26	0.54	0.35	0.79
Resurfacing	<55	8	42.9	1	2.33	0.06	12.97
	55-64	45	288.5	1	0.35	0.01	1.93
	65-74	81	481.2	3	0.62	0.13	1.82
	>=75	46	267.6	0	0.00	0.00	1.38
Partial resurfacing	<55	92	753.0	17	2.26	1.32	3.61
	55-64	72	617.7	12	1.94	1.00	3.39
	65-74	47	343.2	8	2.33	1.01	4.59
	>=75	14	86.2	1	1.16	0.03	6.46

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	682	4,343.6	84	1.93	1.53	2.38
55-64	2,039	12,261.7	189	1.54	1.33	1.77
65-74	4,390	24,759.4	210	0.85	0.74	0.97
>=75	4,317	21,623.2	110	0.51	0.42	0.61

Revision vs Gender

Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	7,110	40,036.7	346	0.86	0.77	0.96
Males	4,318	22,951.3	247	1.08	0.94	1.22

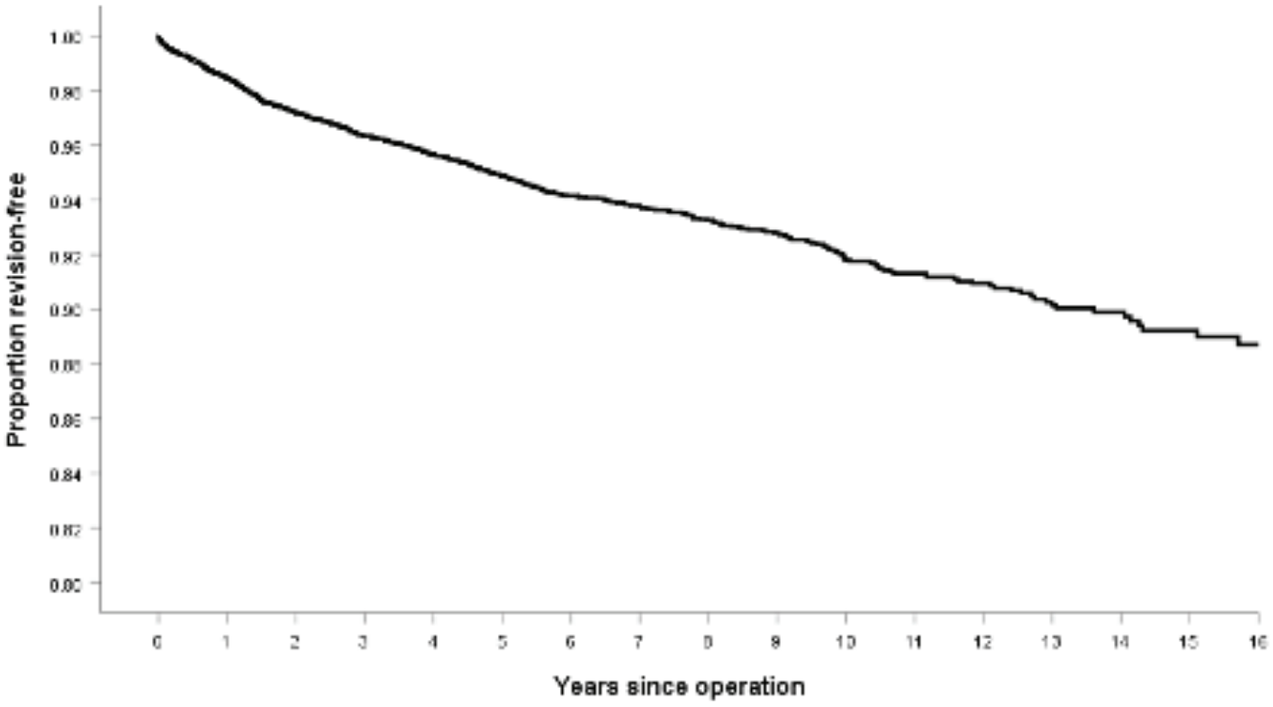
Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops	Observed comp. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<10	3,955	22,990.7	224	0.97	0.85	1.11
>=10	7,473	39,997.3	369	0.92	0.83	1.02

KAPLAN MEIER CURVES

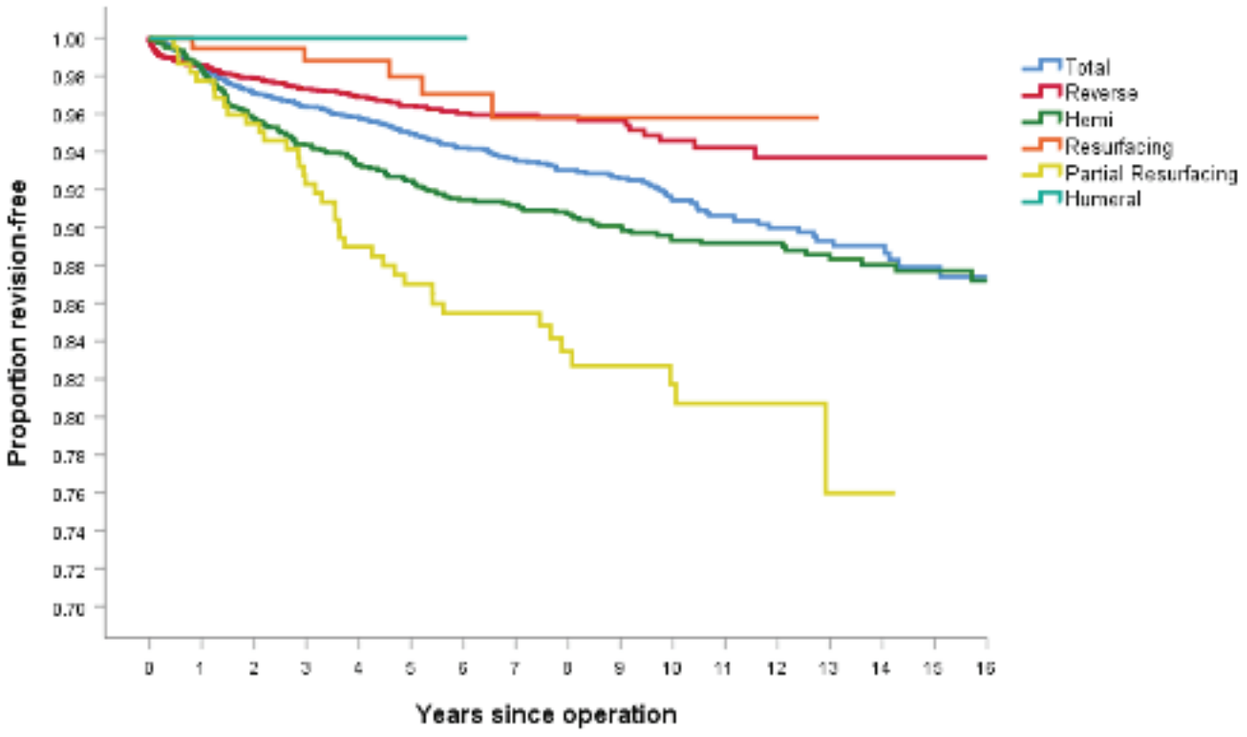
The following Kaplan Meier survival analyses are for the 20 years from 2000 to 2019, with deceased patients censored at time of death.

All Shoulders



Years	% Revision-free	Number
1	98.5	10,018
2	97.2	8,692
3	96.3	7,453
4	95.7	6,324
5	94.9	5,217
6	94.1	4,324
7	93.8	3,553
8	93.3	2,866
9	92.8	2,312
10	91.8	1,871
11	91.3	1,442
12	90.9	1,093
13	90.2	795
14	89.9	563
15	89.2	410
16	88.7	270
17	88.0	161

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 twenty year period and as at July 2020, there were 7,188 shoulder questionnaire responses registered at six months post-surgery.

The average shoulder score was 36.50 (standard deviation 9.39, 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, 70% had an excellent or good score.

Questionnaires at five years post-surgery

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

This dataset represents sequential Oxford shoulder scores for 2,342 individual patients.

At five years post-surgery, 80% of these patients achieved an excellent or good score and had an average of 39.95.

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 773 individual patients.

At ten years post-surgery, 78% of these patients achieved an excellent or good score and had an average of 39.49.

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 shoulder scores for 168 individual patients.

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

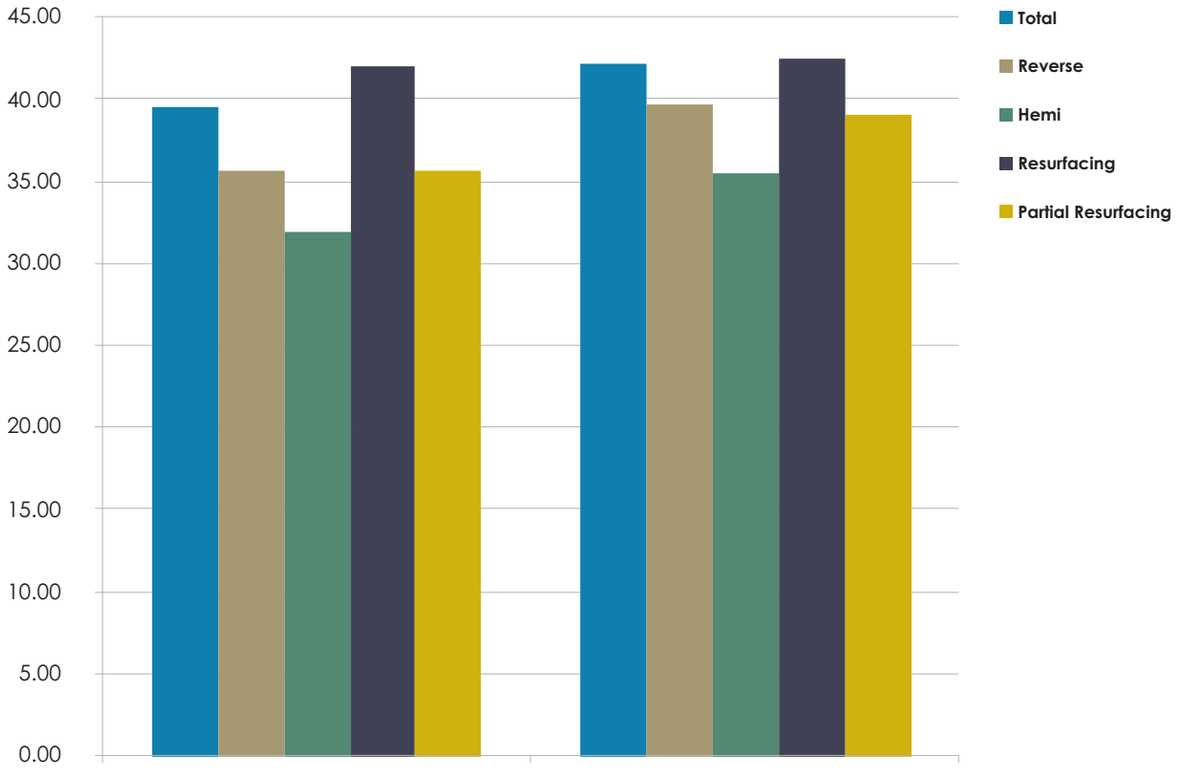
Revision shoulder questionnaire responses

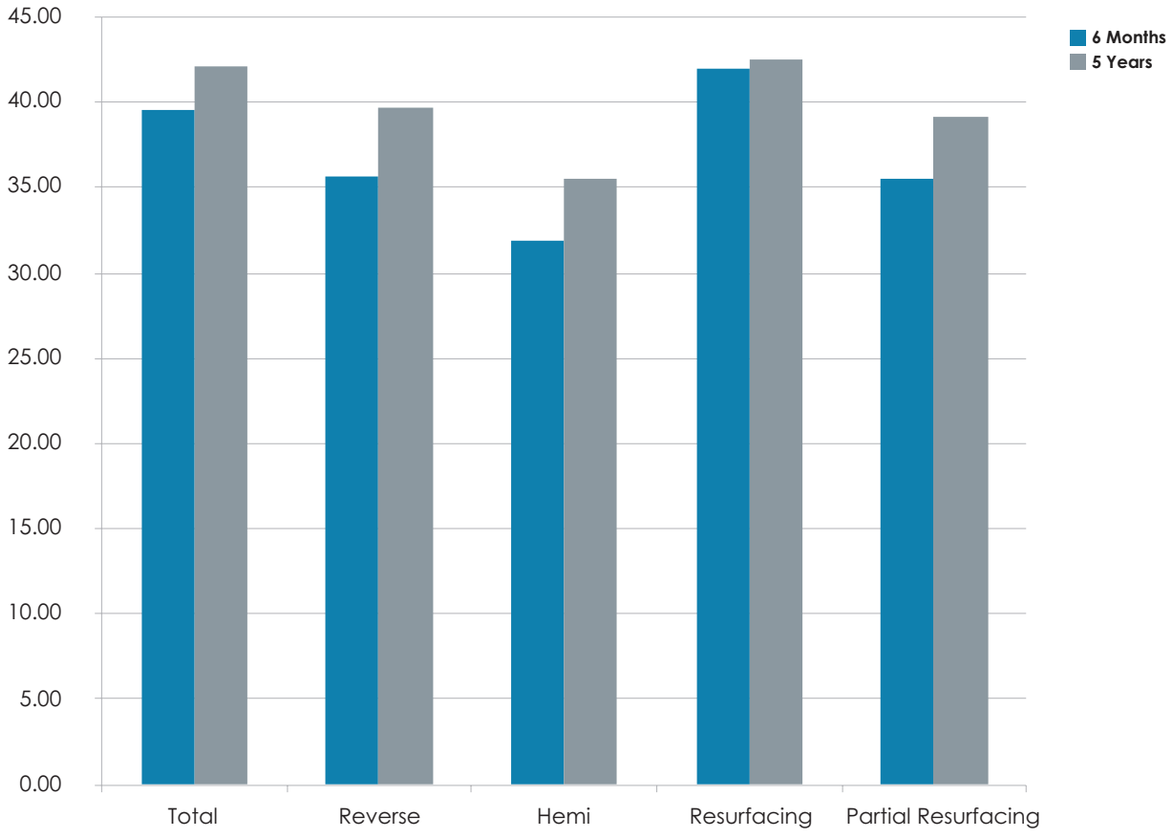
There were 473 revision shoulder responses with 46% achieving an excellent or good score. This group includes all revision shoulder responses. The average revision shoulder score was 31.04 (standard deviation 10.50 range 3 – 48).

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	39.52	0.16	39.20	39.84
	5 Years	42.09	0.24	41.63	42.55
Reverse	6 Months	35.62	0.16	35.30	35.94
	5 Years	39.72	0.31	39.11	40.33
Hemi	6 Months	31.94	0.30	31.35	32.52
	5 Years	35.53	0.45	34.64	36.42
Resurfacing	6 Months	42.02	0.48	41.07	42.98
	5 Years	42.46	1.09	40.27	44.65
Partial Resurfacing	6 Months	35.58	0.83	33.94	37.23
	5 Years	39.11	1.18	36.74	41.49

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



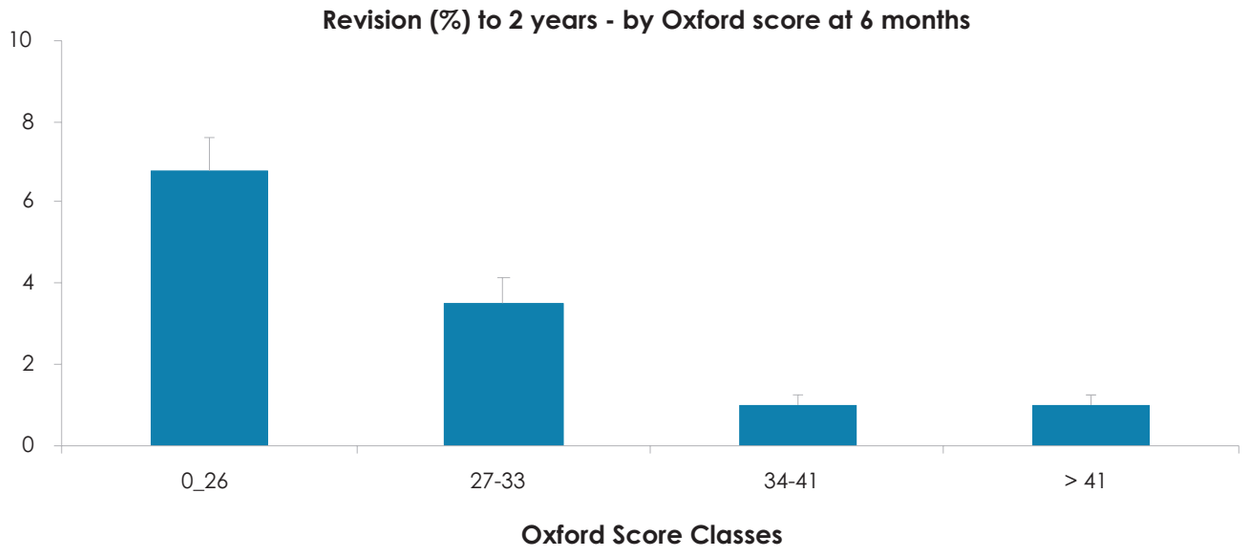

45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Total
Reverse
Hemi
Resurfacing
Partial Resurfacing
6 Months
5 Years

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.

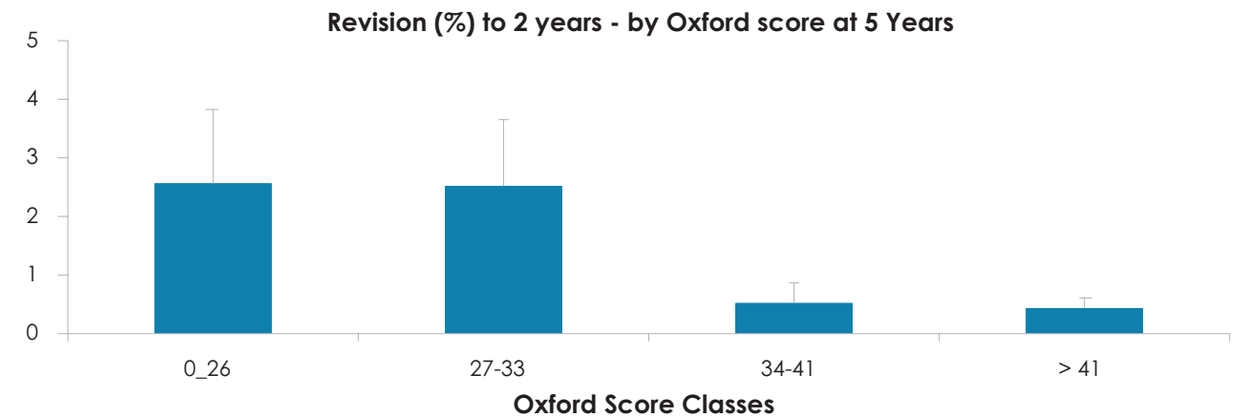


Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date

Kalairajah group	Revision to 2 years	Number revised	%	Standard error
0_26	844	57	6.75	0.86
27-33	833	29	3.48	0.64
34-41	1,778	18	1.01	0.24
> 41	2,079	21	1.01	0.22

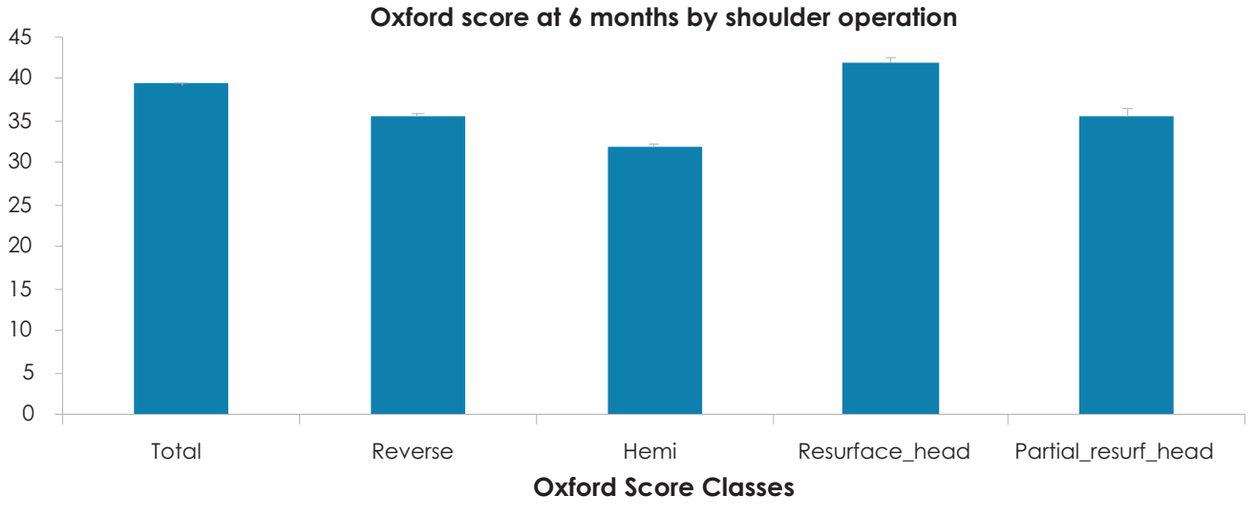
Five year score and revision arthroplasty

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

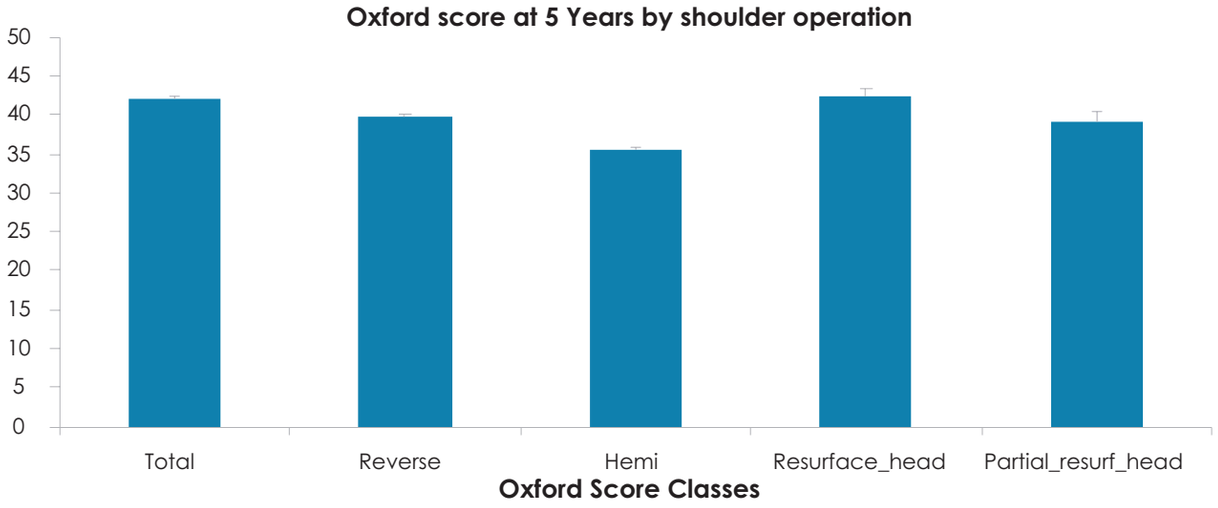


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 5 year score date

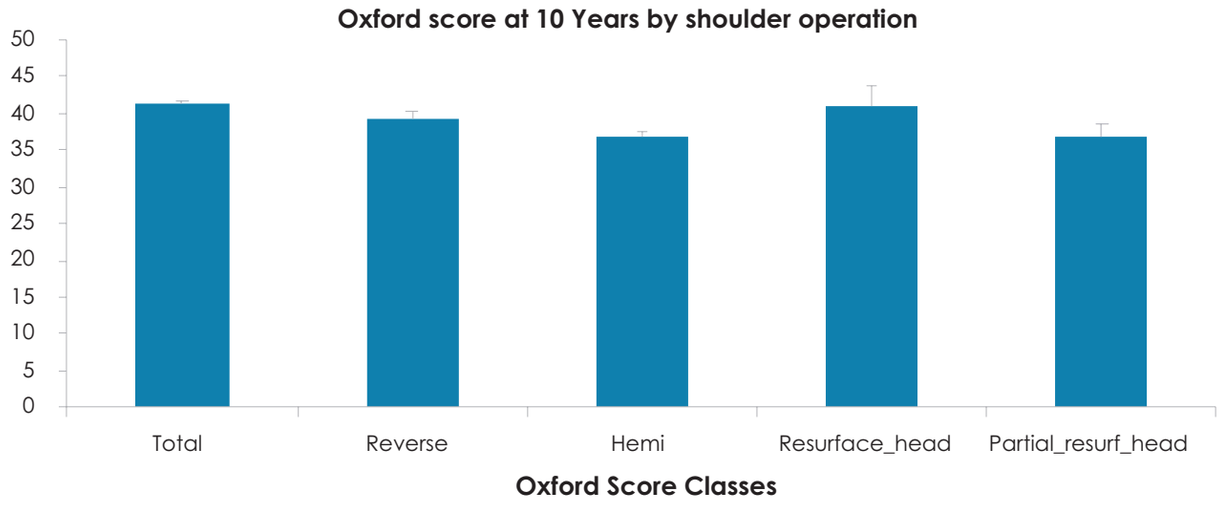
Kalairajah group	Revision to 2 years	Number revised	%	Standard error
0_26	155	4	2.58	1.27
27-33	198	5	2.53	1.11
34-41	391	2	0.51	0.36
> 41	964	4	0.41	0.21



Operation types	No. of operations	Mean	Std. Error	95% confidence interval	
Total	2,460	39.5	0.2	39.2	39.8
Reverse	3,374	35.6	0.2	35.3	35.9
Hemi	1,108	31.9	0.3	31.4	32.5
Resurfacing head	130	42.0	0.5	41.1	43.0
Partial resurfacing head	115	35.6	0.8	33.9	37.2
Total	**7,188**	**36.5**	**0.1**	**36.3**	**36.7**



Operation types	No. of operations	Mean	Std. Error	95% confidence interval	
Total	1,012	42.1	0.2	41.6	42.6
Reverse	754	39.7	0.3	39.1	40.3
Hemi	471	35.5	0.5	34.6	36.4
Resurfacing head	52	42.5	1.1	40.3	44.6
Partial resurfacing	53	39.1	1.2	36.7	41.5
Total	**2,342**	**39.9**	**0.2**	**39.6**	**40.3**



Operation types	No. of operations	Mean	Std. Error	95% confidence interval	
Total	390	41.4	0.4	40.6	42.2
Reverse	118	39.3	0.9	37.6	41.0
Hemi	239	36.8	0.6	35.6	38.0
Resurfacing head	5	41.0	2.5	33.9	48.1
Partial resurfacing head	21	36.7	2.0	32.6	40.8
Total	**773**	**39.5**	**0.3**	**38.9**	**40.1**

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The **twenty year r**eport analyses data for the period January 2000 – December 2019. There were 623 primary elbow procedures registered with an additional 37 registered in 2019.

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	475	148
Percentage	76.28	23.72
Mean age	67.92	65.63
Maximum age	92.41	91.73
Minimum age	36.38	15.16
Standard dev.	11.39	14.12

Previous operation

None	518
Internal fixation for juxta articular fracture	35
Synovectomy+-removal radial head	22
Debridement	15
Osteotomy	3
Ligament reconstruction	3
Interposition arthroplasty	2

Diagnosis

Rheumatoid arthritis	295
Post fracture	203
Osteoarthritis	95
Other inflammatory	14
Post dislocation	10
Post ligament disruption	6

Approach

Posterior	391
Medial	108
Lateral	47

Bone graft

Humeral autograft	40
Humeral allograft	4
Humeral synthetic	1
Ulnar autograft	5

Systemic antibiotic prophylaxis

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

Operating theatre

Conventional	414
Laminar flow	205
Space Suits	83

ASA Class

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

For the fifteen year period 2005 – 2019, there were 469 (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	24
2	210
3	226
4	9

Operative time (skin to skin)

Mean	147 minutes

Surgeon grade

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

The following figures are for the fifteen year period 2005 – 2019.

Consultant	484
Advanced trainee supervised	10
Advanced trainee unsupervised	5

Surgeon and hospital workload

In 2019, 23 surgeons performed 37 primary elbow procedures. These ranged from 1 to 4 per surgeon, with 15 performing 1 elbow procedure.

Hospitals

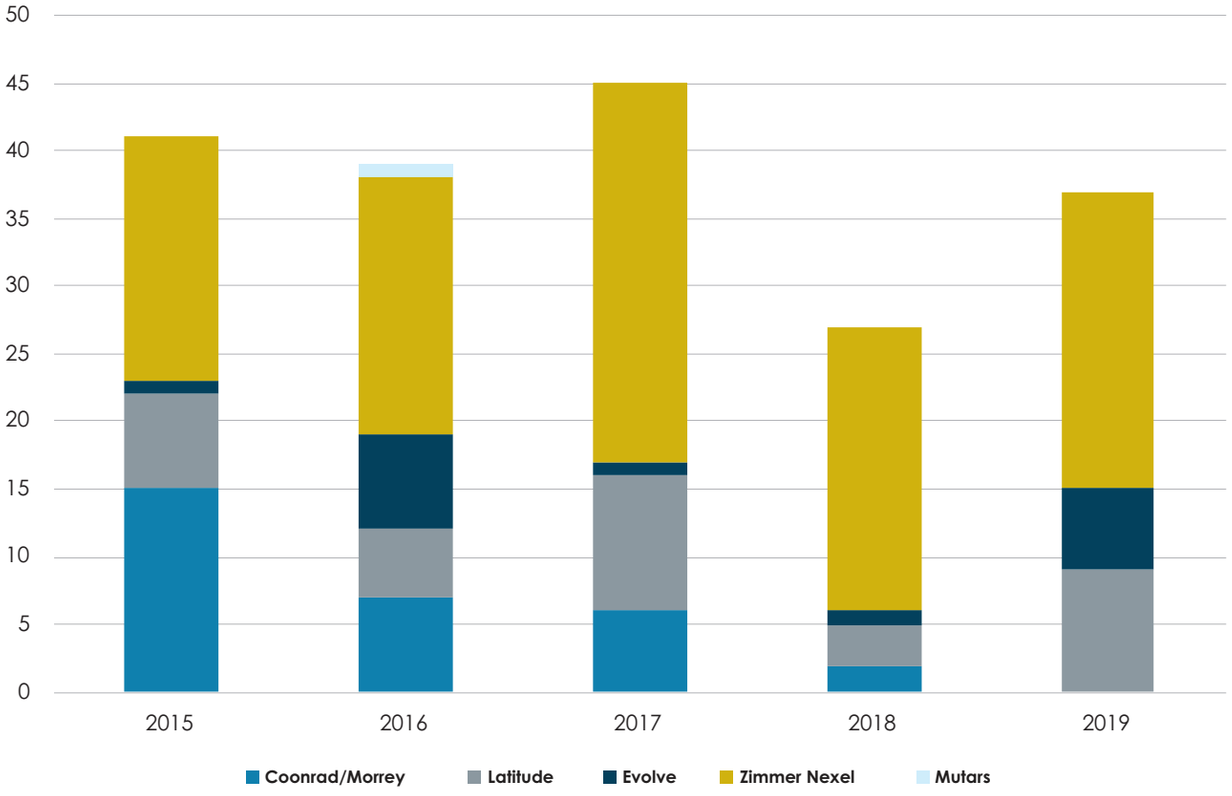
In 2019, primary elbow replacement was performed in 15 hospitals, of which 10 were public and 5 were private.

Prosthesis usage

Elbow prostheses used in 2019

Zimmer Nexel	22
Latitude	9
Evolve	6

MOST USED ELBOW PROSTHESES FOR FIVE YEARS 2015 – 2019



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 twenty year period January 2000 – December 2019, there were 111 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	77	34
Percentage	69.37	30.63
Mean	65.97	64.58
Maximum age	89.08	90.50
Minimum age	31.53	30.34
Standard dev.	10.74	14.79

REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTIES

This section analyses data for revisions of primary elbow procedures for the twenty year period January 2000 – December 2019.

There were 46 revisions of the primary group of 623 (7.3%).

There were 7 that had been revised twice and 1 that had been revised 3 times.

Time to revision

Average	1,708 days
Maximum	5,499 days
Minimum	62 days
Standard deviation	1,465 days

Reason for revision

Loosening ulnar	16
Loosening humeral	16
Deep infection	13
Pain	6
Loosening radial head	5
Fracture humerus	4
Dislocation	2
Fracture ulna	2

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

	Loosening humeral		Loosening Ulnar		Deep infection	
Years	Count	%	Count	%	Count	%
0	1	6.3	1	6.3	2	15.4
1	2	12.5	0	0.0	4	30.8
2	4	25.0	5	31.3	3	23.1
3	3	18.8	3	18.8	0	0.0
4	1	6.3	0	0.0	0	0.0
5	0	0.0	0	0.0	0	0.0
6	0	0.0	0	0.0	1	7.7
7	1	6.3	1	6.3	0	0.0
8	1	6.3	1	6.3	1	7.7
9	1	6.3	2	12.5	0	0.0
10	1	6.3	2	12.5	0	0.0
11+	1	6.3	1	6.3	2	15.4
Total	16		16		13	

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 component years	Number revised	Rate/100	Exact 95% confidence interval	
623	4,178	46	1.10	0.80	1.45

Revision Rate of Individual Prostheses Sorted in Alphabetic Order

Prosthesis	No. Ops.	Observed component years	Number revised	Rate/100	Exact 95% confidence interval	
Acclaim	16	160.4	7	4.37	1.76	8.99
Coonrad/Morrey	346	2,817.7	17	0.60	0.35	0.97
Evolve Stem	26	124.3	2	1.61	0.00	5.81
Kudo	18	172.7	4	2.32	0.63	5.93
Latitude	105	644.7	13	2.02	1.02	3.35
Mutars	1	3.9	0	0.00	0.00	95.76
Sorbie Questor	1	6.8	0	0.00	0.00	54.09
Stanmore custom implant	1	9.4	0	0.00	0.00	39.11
Zimmer Nexel	109	237.97	3	1.26	0.26	3.68

Revision vs Gender

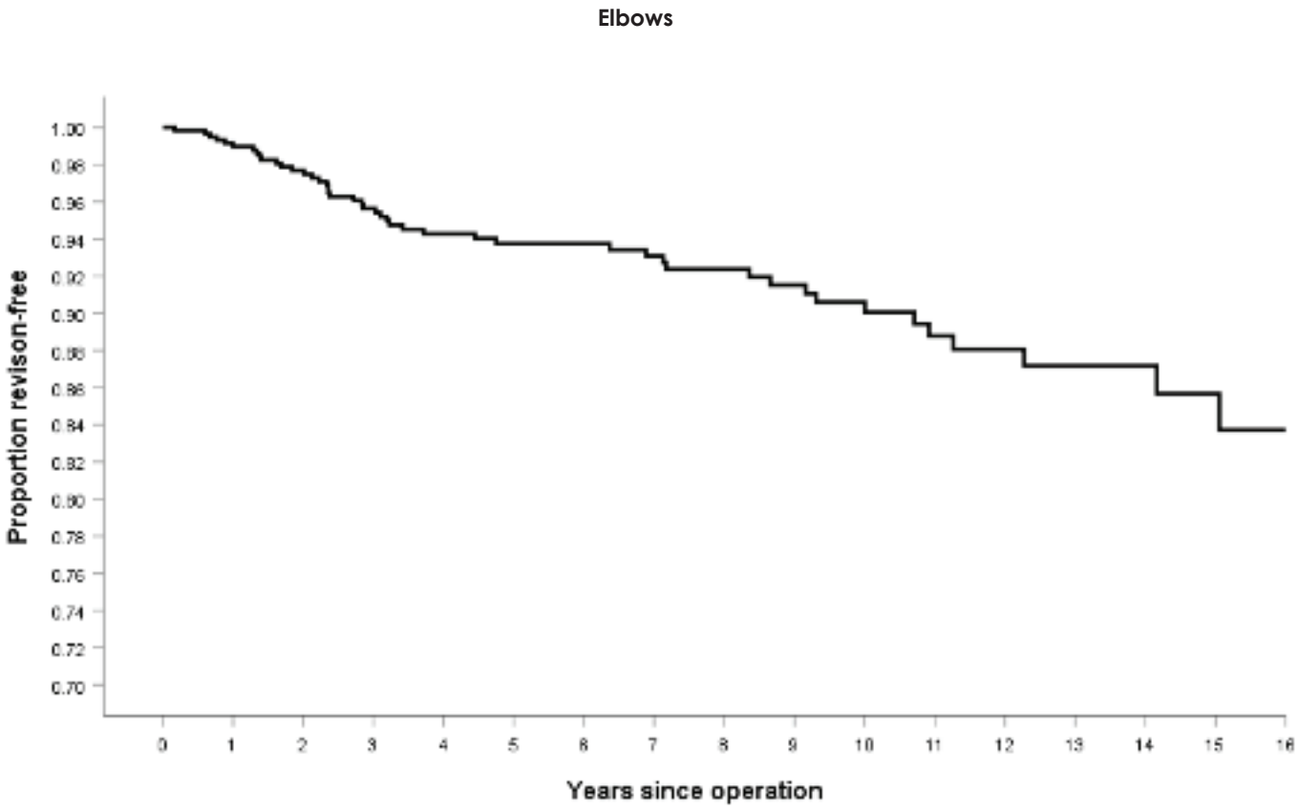
Gender	No. Ops	Observed component. Yrs	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
Females	475	3360.6	29	0.86	0.57	1.22
Males	148	817.2	17	2.08	1.21	3.33

Revision vs Age Bands

Age Bands	No. Ops	Observed component years	Number Revised	Rate/100 component-years	Exact 95% confidence interval	
<55	101	879.3	15	1.71	0.95	2.81
55-64	151	1,188.4	11	0.93	0.46	1.66
65-74	190	1,154.9	14	1.21	0.63	1.98
>=75	181	955.2	6	0.63	0.23	1.37

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 20 years from 2000 to 2019, with deceased patients censored at time of death.



Years	% Revision-free	Number
1	99.0	559
2	97.7	511
3	95.6	436
4	94.3	378
5	93.7	325
6	93.7	300
7	93.1	273
8	92.4	232
9	91.5	200
10	90.6	168
11	88.8	137
12	88.1	106
13	87.2	80

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 4 year period 2016 – 2019 there were n = 73 responses.

Average	32.74
Maximum	48
Minimum	8

LUMBAR DISC REPLACEMENT

PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the **eighteen year** period January 2002 – December 2019.There were 180 lumbar disc replacements registered, an additional 17 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	80	100
Percentage	44.44	55.56
Mean age	39.84	39.84
Maximum age	62.19	60.71
Minimum age	24.07	22.25
Standard dev.	8.76	7.95

Disc replacement levels

L3/4	21
L4/5	118
L5/S1	40

Fusion levels

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

Previous operation

Discectomy	30
L3/4	0
L4/5	11
L5/S1	18

Diagnosis

Degenerative disc disease

L3/4	12
L4/5	63
L5/S1	93

Annular tear MRI scan

L3/4	13
L4/5	72
L5/S1	35

Discogenic pain on discography

L3/4	20
L4/5	87
L5/S1	63

Approach

Retroperitoneal midline	150
Retroperitoneal lateral	4
Transperitoneal	12

Intraoperative complications

Damage to major veins	13
Subsidence	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	152

Operating theatre

Conventional	103
Laminar flow	75
SpaceSuits	2

Operative time (skin to skin)

Mean	133 minutes

Surgeon grade

Consultant	180

REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

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

There were 3 revisions of the primary group of 180 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

CERVICAL DISC REPLACEMENT

This report analyses data for the **sixteen year** period January 2004 – December 2019. There were 539 primary cervical disc replacements, an additional 86 from the previous year.

Data Analysis

The average age for a cervical disc replacement was 45 years, with a range of 22 – 73 years.

	Female	Male
Number	233	306
Percentage	43.23	56.77
Mean age	46.78	44.92
Maximum age	73.32	68.29
Minimum age	23.26	22.07
Standard dev.	8.39	9.12

Disc replacement levels

C3/4	13
C4/5	56
C5/6	285
C6/7	257
C7T1	10

Previous operation

Foraminotomy	19
Adjacent level fusion	23
Adjacent level disc arthroplasty	2

Diagnosis

Acute disc prolapse	366
Chronic spondylosis	57
Neck pain	34

Approach

Anterior right	312
Anterior left	101

Intra operative complications

Equipment failure	1
Removal of implant	1
Tear jugular vein	1
Misplaced prosthesis removed and a new device placed	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	n = 473

Operating theatre

Conventional	230
Laminar flow	217
SpaceSuits	1

Operative time (skin to skin)

Average	108 minutes

Surgeon grade

Consultant	536
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.

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	210
Mean	19.25

RE-OPERATION WITHOUT REPLACEMENT OR REMOVAL OF ANY PROSTHETIC COMPONENTS

The re-operation form was introduced in December 2015.

For the five-year period 2015 – 2019 there were 380 re-operations registered, 100 more than last year.

For this period the re-operations registered were; hips n = 205, knees n = 152, ankles n = 16, shoulders n = 6 and elbows n = 1

Reason for Re-operation

Deep infection	116
Dislocation of joint	40
Dislocation of bearing	8
Fracture	56
Instability	6
Malalignment	0
Impingement	12
Stiffness	70
Haematoma evacuation	24
Arthrofibrosis	3

Procedure

Open lavage	135
Arthroscopic lavage	7
Closed reduction of dislocation	26
Open reduction of dislocation	12
Fracture fixation	47
Soft tissue procedure	27
Ligament reconstruction	5
Osteotomy	3
Bone debridement	22
Arthrolysis	7
MUA	66

ASA	Number
1	24
2	167
3	142
4	21

Surgeon grade

Consultant	292
Advanced trainee supervised	25
Advanced trainee unsupervised	51
Basic trainee	10

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Hip
Total Hip Arthroplasty ❑ Resurfacing Arthroplasty ❑ 31.05.2010

Date: ..... **Consultant:** .....

BMI:.....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

[If different from patient label]

Hospital: .....

Town/City

.....

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

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 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 Hip Joint

07.04.2005

Date: .....

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

Side:..... **

Hospital: .....

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Town/City:

Tick Appropriate Boxes

REASON FOR REVISION
- ❑ Loosening acetabular
- ❑ Loosening femoral co
- ❑ Dislocation
- ❑ Pain

plasty
- ❑ 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

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Knee
❑ Total Knee Arthroplasty ❑ Unicompartmental ❑ Patellofemoral 31.05.2010

Date: ..... **Consultant:** .....

BMI:.....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

[If different from patient label]

Hospital: .....

Town/City:

.....

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

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

FEMUR

Please do not fold 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

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

NEW ZEALAND JOINT REGISTRY
Revision Knee Joint

07.04.2005

Date: .....

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

Side:..... **

Patient Name:
Address:

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

Attach Patient Label

Hospital: .....

Town/City:
.....

Tick Appropriate Boxes

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
❑ 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 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.....

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Shoulder

07.04.2005

Date: .....

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

Side:..... **

Hospital: .....

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Town/City:
.....

Tick Appropriate Boxes

REASON FOR REVISION

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

Date Index Operation: .....

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

REVISION

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

APPROACH

- ❑ Deltopectoral
- ❑ Other: specify

HUMERUS

Please do not fold bar-coded labels

GLENOID

Please do not fold bar-coded labels

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 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

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Ankle

31.05.2010

Date: .....

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

BMI:.....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Hospital: .....

Town/City
.....

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

APPROACH

❑ Anterior ❑ Anterio-lateral ❑ Other

TIBIA

Please do not fold 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 ❑ Adv Trainee Unsupervised ❑ Adv Trainee Supervised Year..... ❑ Basic Trainee

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

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

NEW ZEALAND JOINT REGISTRY
Revision Ankle Joint

07.04.2005

Date: .....

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

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Side:..... **

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

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Elbow

07.04.2005

Date: .....

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

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Hospital: .....

Town/City:

.....

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

07.04.2005

Date: .....

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

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Side:..... **

Hospital: .....

Town/City: .....

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold 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 Supervised Year..... ❑ Adv Trainee Unsupervised ❑ Basic Trainee

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

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

NEW ZEALAND JOINT REGISTRY
Primary Cervical Disc Replacement

14.08.2008

Date: .....

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

Patient Name:
Address:

DOB: NHI:

Attach Patient Label

Hospital: .....

Town/City:
.....

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

LEVELS OF DISC REPLACEMENT

PRE OP PATIENT SCORE (NECK DISABILITY INDEX) .....

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

PREVIOUS OPERATION

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

14.08.2008

Date: .....

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

Patient Name:
Address:

DOB: NHI:

Attach 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

14.08.2008

Date: .....

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

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Hospital: .....

Town/City

.....

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

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

Other .....

FUSION Levels
- ❑ L3/4
- ❑ L4/5
- ❑ L5/S1

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

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
- ❑ Retroperitoneal lateral abdominal wall incision
- ❑ Transperitoneal
- ❑ 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

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

If you wish to see a progress report on the study, go to www.nzoa.org.nz/nzoa-joint-registry **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

If you wish to see a progress report on the study, go to www.nzoa.org.nz/nzoa-joint-registry **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

If you wish to see a progress report on the study, go to www.nzoa.org.nz/nzoa-joint-registry **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

If you wish to see a progress report on the study, go to www.nzoa.org.nz/nzoa-joint-registry **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. **During the past 4 weeks this has applied to me**:
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
☐	☐	☐	☐	☐

Finally, please check that you have answered every question.
Thank you very much.

Revision Manchester-Oxford Foot Questionnaire (MOxFQ)

Circle as appropriate **Right / Left** **Full**

Name_____

Please tick (√) one for each statement

1. **During the past 4 weeks this has applied to me**:
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
☐	☐	☐	☐	☐

Finally, please check that you have answered every question.
Thank you very much.

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

If you wish to see a progress report on the study, go to www.nzoa.org.nz/nzoa-joint-registry **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 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

If you wish to see a progress report on the study, go to www.nzoa.org.nz/nzoa-joint-registry **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
☐	☐	☐	☐	☐

Revision 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
☐	☐	☐	☐	☐

Finally, please check back that you have answered each question.
Thank you very much.

NECK DISABILITY INDEX (NDI) QUESTIONNAIRE

Patient Name: …… **Date of Birth:** ……..……...

Patient Address: …… **Operating Surgeon:** ……

…… …… **Date of Surgery:** ……

Please answer **every section**. Mark **one box only** in each section that most closely describes you today.

Section 1: Pain Intensity

- ☐ I have no pain at the moment.
- ☐ The pain is very mild at the moment.
- ☐ The pain is moderate at the moment.
- ☐ The pain is fairly severe at the moment.
- ☐ The pain is very severe at the moment.
- ☐ The pain is the worst imaginable at the moment.

Section 2: Personal Care (Washing, Dressing, etc)

- ☐ I can look after myself normally, without causing extra pain.
- ☐ I can look after myself normally, but it causes extra pain.
- ☐ It is painful to look after myself and I am slow and careful.
- ☐ I need some help, but manage most of my personal care.
- ☐ I need help every day in most aspects of self care.
- ☐ I do not get dressed, I wash with difficulty and stay in bed.

Section 3: Lifting

- ☐ I can lift heavy weights without extra pain.
- ☐ I can lift heavy weights, but it gives extra pain.
- ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example, on a table.
- ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage light to medium weights if they are conveniently positioned.
- ☐ I can lift very light weights.
- ☐ I cannot lift or carry anything at all.

Section 4: Reading

- ☐ I can read as much as I want to with no pain in my neck.
- ☐ I can read as much as I want to with slight pain in my neck.
- ☐ I can read as much as I want to with moderate pain in my neck.
- ☐ I can't read as much as I want because of moderate pain in my neck.
- ☐ I can hardly read at all because of severe pain in my neck.
- ☐ I cannot read at all.

Section 5: Headaches

- ☐ I have no headaches at all.
- ☐ I have slight headaches which come infrequently.
- ☐ I have moderate headaches which come infrequently.
- ☐ I have moderate headaches which come frequently.
- ☐ I have severe headaches which come frequently.
- ☐ I have headaches almost all the time.

Section 6: Concentration

- ☐ I can concentrate fully when I want to, with no difficulty.
- ☐ I can concentrate fully when I want to, with slight difficulty.
- ☐ I have a fair degree of difficulty in concentrating when I want to.
- ☐ I have a lot of difficulty in concentrating when I want to.
- ☐ I have a great deal of difficulty in concentrating when I want to.
- ☐ I cannot concentrate at all.

Section 7: Work

- ☐ I can do as much work as I want to.
- ☐ I can only do my usual work, but no more.
- ☐ I can do most of my usual work, but no more.
- ☐ I cannot do my usual work.
- ☐ I can hardly do any work at all.
- ☐ I can't do any work at all.

Section 8: Driving

- ☐ I can drive my car without any neck pain.
- ☐ I can drive my car as long as I want, but with slight neck pain.
- ☐ I can drive my car as long as I want, but with moderate neck pain.
- ☐ I can't drive my car as long as I want because of moderate pain in my neck.
- ☐ I can hardly drive at all because of severe pain in my neck.
- ☐ I can't drive my car at all.

Section 9: Sleeping

- ☐ I have no trouble sleeping.
- ☐ My sleep is slightly disturbed (less than 1 hour sleepless).
- ☐ My sleep is mildly disturbed (1-2 hours sleepless).
- ☐ My sleep is moderately disturbed (2-3 hours sleepless).
- ☐ My sleep is greatly disturbed (3-5 hours sleepless).
- ☐ My sleep is completely disturbed (5-7 hours sleepless).

Section 10: Recreation

- ☐ I am able to engage in all my recreation activities, with no neck pain at all.
- ☐ I am able to engage in all my recreation activities, with some pain in my neck.
- ☐ I am able to engage in most, but not all, of my usual recreation activities because of pain in my neck.
- ☐ I am able to engage in only a few of my usual recreation activities because of pain in my neck.
- ☐ I can hardly do any recreation activities because of pain in my neck.
- ☐ I can't do any recreation activities at all.

PATIENT INFORMATION SHEET

Introduction:

You are invited to contribute information to the National Joint Replacement Register. The Register currently records the technical data on all artificial joint replacement surgery performed in New Zealand, e.g., the different types of artificial joints implanted, whether cemented or not, how long the operation took, the need to use antibiotics etc., but no personal information is recorded apart from the person's name, address and date of birth. The National Register will provide independent data on the performance of these artificial joints over many years. The data will be used in the future for joint replacement outcomes research and will identify the factors which will provide the best long term surgical results for New Zealanders.

ABOUT YOUR INVOLVEMENT

In order to enhance the value of the research results it will be extremely valuable and helpful to have your opinion as to the success over the years of your hip, knee, partial knee, shoulder, elbow or ankle joint replacement. Therefore you are invited to answer a few written questions at regular intervals on how you feel about your recent joint replacement.

If you agree to participate, we ask you to complete the 12 point questionnaire enclosed. The same questionnaire will be sent out at intervals on a long term basis. It will mean that we can assess your satisfaction with the operation you have received.

We ask you to return the questionnaire using the pre-paid envelope provided.

RISKS AND BENEFITS

There is no risk to you personally by participation.

There will be many benefits to the collection of data. There will be a large amount of very useful information available for long term research. This will benefit all New Zealanders and remove the need to rely on overseas information about patient satisfaction with outcomes.

PARTICIPATION

Your participation is entirely voluntary (your choice). You do not have to take part, and if you choose not to take part you will receive the usual treatment or care.

When answering the questionnaire, you do not have to answer any questions you do not wish to.

If you do agree to take part you are free to cease filling in the questionnaire at any time in the future without having to give a reason and this will not affect your continuing health care in any way. You can do this by writing to:

Department of Orthopaedic Surgery & Musculoskeletal Medicine
Lower Ground Floor, Parkside West
Christchurch Hospital
Private Bag 4710
Christchurch 8140

GENERAL

If you wish, your GP will be notified that you are completing a questionnaire for the Register. Please give GP's name and address.

If you have any queries about your rights as a participant you may wish to contact a Health and Disability Services Consumer Advocate, free phone 0800 11-22-33.

CONFIDENTIALITY

No material that could personally identify you will be used in any reports from this data collection.

The questionnaire results will be stored on a computer that is itself in an office that is locked when not in use.

Approval to gain access to this data for research purposes will only be granted by the Professor of Orthopaedic Surgery at the Christchurch School of Medicine, Christchurch Hospital and only for research approved by an accredited ethics committee.

RESULTS

These questionnaire responses have been collected throughout New Zealand over many years and already meaningful research outcomes have been realised.

If you wish, these can be viewed at www.nzoa.org.nz/nzoa-joint-registry.

STATEMENT OF APPROVAL

This study has received ethical approval from your Regional Ethics Committee.

Please feel free to contact the researcher if you have any questions about this questionnaire.