



THE NEW ZEALAND JOINT REGISTRY

TWENTY-TWO YEAR REPORT
JANUARY 1999 TO DECEMBER 2020

22

YEARS





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EDITORIAL COMMENT

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

The Registry Management Committee is pleased to present the twenty-two 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 2020 was 348,379, which had been performed on 230,891 individual patients, of which 56,759 (24%) have now died during the twenty-two year period.

The number of observed component years (ocys) contained within the Registry is now over two million.

The increase of 22,229 registered joints for 2020 remains almost identical to the 22,326 performed in 2019.

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 have been confined to primary registered arthroplasties.

Hip Arthroplasty

Introduction of new data forms in October 2020 have introduced the hemiarthroplasty (79) to the conventional and resurfacing categories. There are 154,199 conventional total hip arthroplasties with an overall revision rate of 0.70 per 100 ocys (95% confidence interval; 0.68-0.71) with a 20-year prosthesis survival of 84.17% (cemented 83.79%; uncemented 84.37% and hybrid 84.55%).

More females than males received a hip replacement (53.80% vs 46.20%), with a slightly higher mean age (68.58 vs 65.87 years), but a very wide range for both (13 to 101 yrs.)

Most had no previous surgery (96.15%) and a diagnosis of osteoarthritis (88.0%). The posterior approach was utilised in 67.12 %, while the percentage of patients operated on through a lateral approach decreased slightly (22.85% vs. 23.7% in 2019).

From 2014 to 2018, approximately 200 hips per year were performed through the anterior approach (218 in 2018). Its popularity increased over the last two years however, with 317 anterior approaches in 2019, increasing to 345 anterior approaches in 2020.

Popularity of fully cemented hip replacement has fallen over the last 3 years, to sit at 5.3% in 2020.

The ceramic on polyethylene bearing surface continues to increase in popularity, rising from 42% of the total in 2017 to 52% in 2019 and 54% in 2020, mainly at the expense of metal on polyethylene.

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 from a high of 17.6% in 2011, to 6.95% in 2020.

The most popular head size overall remains 32mm, although there has been increasing use of 36mm heads since 2017, 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 44 for 2020, and the average for the previous 5 years being 32 per annum. The reasons for this are unclear.

The use of cross-linked polyethylene remains the dominant choice, again accounting for in excess of 96.9% of all polyethylene used.

The fifth row added to age banding analysis, age of patients less than 40 years, will become increasingly important as improved materials are expanding the indications for total hip joint replacement to younger patients

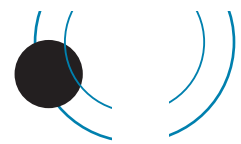
Despite these expanding indications, the percentage of patients under the age of 40 remains the same in 2020 as it did in 2019 (1.57%). As expected, revision rate drops with patient age.

In the next Table, Revision for Age Bands vs Bearing Surface, if we take out the use of ceramic on metal articulation (13 patients), the data supports use of ceramic on ceramic articulations in patients under the age of 40.

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 78 patients with a total of 806 ocys. Hybrid and uncemented results in this group are similar.

The Table headed Revision versus Hip Prostheses Combinations sorted on Revision Rate on pp 28 – 35, should allow each surgeon to assess the results of what prosthesis combinations they use. It forms the basis for identifying the following prothesis combinations.

A new prothesis, the Quadra-H/Acetabular Shell combination appeared in last year's report (greater than 50 implanted prostheses), 11 having been implanted in 2018. A further 73 were implanted in 2019, with 2 requiring revision, giving a revision rate of 4.86/100 ocys. It was not highlighted then



"The total number of registered joint arthroplasties at 31st of December 2020 was **348,379**, which had been performed on **230,891** individual patients, of which **56,759** (24%) have now died during the twenty-two year period. "

because its lower 95% CI was 0.59, below the NZ mean. A further 119 implants were used in 2020, and 8/207 have now required revision, with a lower 95% CI of 1.81. Although only in use for 3 years, further use of this prosthesis has to be questioned.

It is pleasing to see one of the two combinations high-lighted in last year's report, the ABGII/RM Pressfit Cup, has not been used in 2020. The other, the CPT/G7 acetabulum was used a further 26 times in 2020, and although there was only 1 further revision of this prosthesis in 2020, its revision rate remains unacceptably high. Its continued use should also be questioned.

The Accolade II/Continuum TM combination was highlighted as requiring careful monitoring after it appeared for the first time in last year's report with 95% CI's outside the NZ mean. It was used 56 times in 2020, but with a further 3 revisions. Its lower 95% CI of 1.34/100 ocys is way above the NZ mean.

Once again, its continued use should be questioned.

Since 2018, there have been increasing numbers of 0's in the early rows of the Procedures year column of the Table labelled Revision vs. hip prostheses combinations sorted on revision rate. Essentially we are improving our NZ Registry results by early identification of poorly performing prostheses.

The Corail/Pinnacle combination was again the most popular in 2020, with 1,528 primary arthroplasties, while the Exeter/Trident combination was 1,093 primary arthroplasties. These are virtually identical to the 2019 figures. Both have revision rates well below the New Zealand mean, 0.64 and 0.44 ocys respectively.

Resurfacing hip arthroplasty

The number of resurfacing arthroplasties remains steady at 122 in 2020, similar to the 124 in 2019, and 118 in 2018, but an increase from the low point of their use in 2016. The revision rate has fallen steadily since 2018 (1.06, 0.90-1.18) and for 2020 sits at 0.95 ocys (0.81- 1.10).

Knee Arthroplasty

126,603 conventional total knee arthroplasties have been registered totalling 934,868 ocys with the overall revision rate 0.47/100 ocys, (95% confidence interval; 0.46-0.49) and the excellent 21- year survival of 91.7%.

The number of TKA's implanted per year was slightly reduced, with 8,135 implanted in 2020, less than the 8,378 implanted in 2019.

Presumably, this is due to the effects of Covid 19 in 2020.

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 2020, with the Attune holding second place.

The number of Triathlons implanted in 2020 was slightly reduced compared to 2019. Attune continues to increase.

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 0.315/100 ocys.


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 prostheses, Persona, Trekking and the Vanguard, one fully uncemented prosthesis (LCS) and one hybrid (Optetrak), have a higher revision rate than the overall rate of 0.47/100ocys 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, as revision for infection occurs more commonly in the first- year post implantation.

Although fully uncemented knee arthroplasty represents just 8% 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 three 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 that have both PS and CR versions.

There are 746 registered patello-femoral prostheses, with 66 added in 2020, compared to 79 in 2019.

85 have been revised and the revision rate at 2.03/100 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 14,730 registered primary unicompartmental prostheses with a total of 108,240 ocys, a mean revision rate of 1.15/100 ocys and a 20-year survival of 76%. Unexplained pain remains the main listed reason for revision. It is to be hoped that the updated data collection forms combined with increased surgeon vigilance, will continue to improve the diagnostic accuracy of reason for revision surgery.

There were 1,245 registrations in 2020, an increase of 211 on the 2019 numbers.

Once again, the Oxford uncemented prosthesis was very dominant, accounting for 64% of the unicompartmental prostheses implanted in 2020.

The revision rate is 0.77/100 ocys for the medial Oxford UKR's and the lateral Oxford UKR's have a revision rate of 1.75/100ocys.

The Zimmer unicompartmental prosthesis has a lower rate of 0.52/100ocys.

The overall revision rate is 1.15/100 ocys, however surgeons who perform less than 10 UKR's per year have a significantly higher revision rate – 1.34/100 ocys compared to surgeons doing 10 or more procedures 1.01/100 ocys.

81 surgeons performed 1,034 UKR's (40 <10 cases/year) in 2020, compared to 90 surgeons performing 1,053 UKR's (56 <10 cases/year) in 2019.

The overall unicompartmental knee revision rate remains significantly higher when compared to total knee

replacements by a factor of 2.4 times. (TKR 0.48 v. UKR 1.15 ocys). (This difference is exaggerated by a large cohort of older cemented Oxford UKR's with a revision rate of 1.38/100 ocys.)

Patients having UKR's report consistently superior Oxford scores at 5Y, 10Y and 15Y post-surgery, with more patients having excellent or good Kalairajah scores (group 1 and 2) (88%, 84% and 84% v.84%, 82% and 79%) at 5Y, 10Y and 15Y.

Similar numbers have poor scores Kalairajah group 1 (<27) (4.5%, 7.3% and 7.2% v. 4.4%, 5.5% and 6.5%.

Given that there is a clear relationship between both surgeon volume and outcome, and the most commonly used contemporary prostheses 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 1,877 primary registered ankle prostheses with a total of 12,711 ocys.

There were 139 primary ankle arthroplasties registered in 2020.

Shoulder arthroplasty

There are 12,615 registered primary shoulder prostheses, with a total of 71,988 ocys. An additional 1,187 primary shoulder replacements have been performed in 2020. This continues the trend over the last decade of a 6-7% annual growth in the utilisation of shoulder arthroplasty in New Zealand.

Reverse arthroplasty remains the predominant implant in 2020, now representing 74% of all shoulder arthroplasties performed. 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.

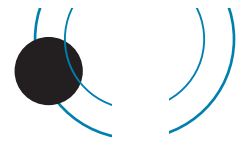
The 10-year survival of all shoulder prostheses is 91.7%, whilst the 15-year revision free survival is 89.0%.

The revision rate of 0.94 per 100 component years for primary shoulder arthroplasty remains steady, as do the rates of total (0.95) and reverse arthroplasty (0.73). The burden of revision surgery in shoulder arthroplasty continues to increase at a rate of 12%.

1,006 revision cases have been performed, an increase of 95 on the previous year. 5% of all shoulder arthroplasties have undergone revision surgery. Pain remains at this time, the main reason 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 and total resurfacing have been removed as a separate category in the report and are now incorporated in the total shoulder and hemiarthroplasty categories.



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 last year's report. 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 664 registered primary elbow prostheses with a total of 4,573.7 ocys.

There were 39 primary elbow prostheses registered in 2020.

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

In 2020, the Zimmer Nexel was the most commonly implanted elbow prosthesis. With a cumulative total of 127 Nexel, the revision rate of 0.88/100 ocys is comparable, but not better than that of Coonrad-Morrey 0.60/100 ocys.

As this is a relatively new elbow prosthesis, we will observe its performance with keen interest.

Oxford 12 Questionnaires

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.

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





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- 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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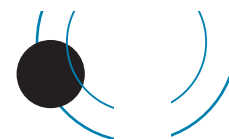
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DEVELOPMENT AND IMPLEMENTATION OF THE NEW ZEALAND JOINT REGISTRY

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 new data forms were introduced at the beginning of December 2020.

In order to improve data accuracy, a surgeon signature box has been added.

A funding box has been added with the options ACC, Private, DHB and DHB outsourced.

A theatre number has been added, meaning that individual theatre ventilation can be analysed.

Robotic assisted has been added under Surgical Adjuncts for hip and knee and under Approach for ankles.

Bone graft has been deleted on all forms except revision shoulder.

Surgeon Attire is a new heading. Option 1 is Space Suits/ Helmet Fan. Option 2 is Conventional Gown.

Revision forms have been changed to include re-operation. There is now a Revision/Reoperation form for each joint.

The hip form now has 3 procedure sub types- total, resurfacing and hemiarthroplasty, a new sub type.

The knee form also has 3 procedure sub types- total, patello-femoral and unicompartmental.

In conclusion, the aim has been to minimise compromising legacy data, while deleting data points that have not been used in research projects over the past 20 years.

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)

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 IV: April 1st, 1999

The National Joint Registry became fully operational throughout New Zealand.

Inclusion of Other Joint Replacement Arthroplasties

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

The validated Oxford questionnaire was available for the shoulder and derived, but not validated, questionnaires developed for the elbow and ankle joints.

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

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

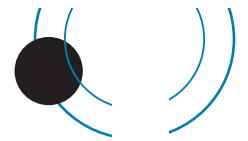
It is quite easy to check the compliance for public hospitals as they are required to make regular returns with details of all joint replacement surgery to the NZ Health Information Service. The registered joints from the Registry can be compared against the hospital returns for the same period and the 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 2021 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 HealthUI (Health User Interface) 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 are 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 22 - year period to December 2020 was 348,379.

During this period 230,891 individual patients were registered, of which 56,759 (24%) have died.

Bilateral total hips

2,887

patients (5,774 hips)
4% of primary hips

Bilateral total knees

4,860

patients (9,720 knees)
8% of primary knees

Bilateral Unicompartamental knees

1,132

patients (2,264 knees) 15% of
unicompartamental knees

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

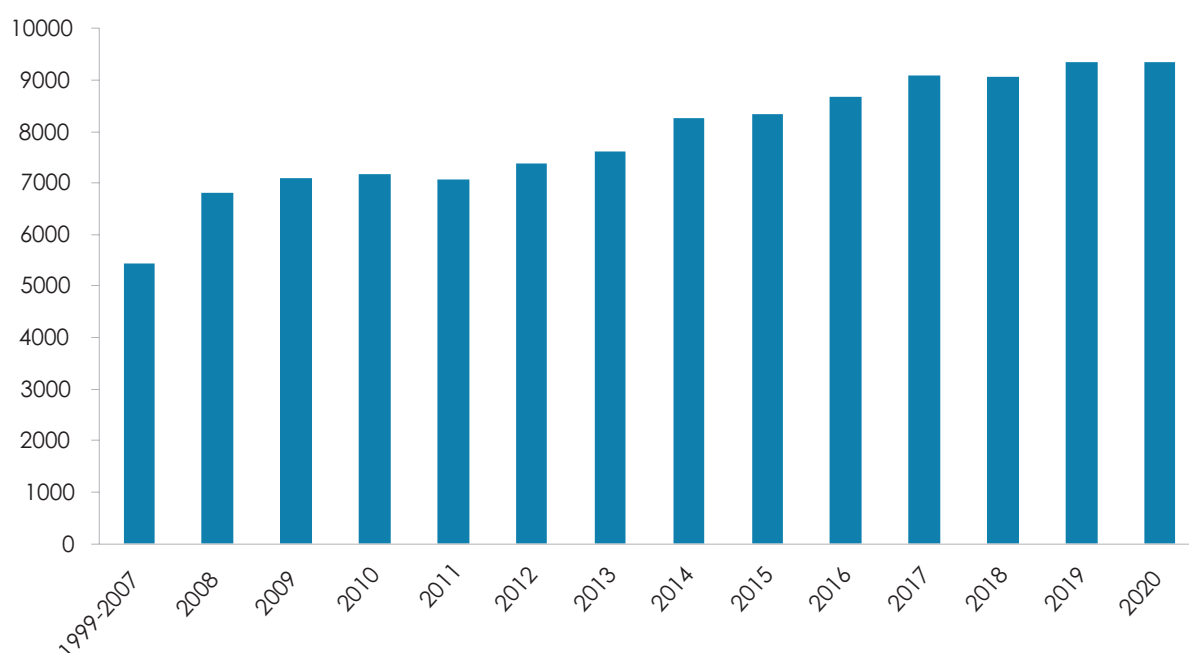
HIP ARTHROPLASTY

PRIMARY HIP ARTHROPLASTY

The **twenty-two-year** report analyses data for the period January 1999 – December 2020.

New data forms introduced in October 2020 now have 3 categories of hip replacement. These are total hips with 154,199 registered, resurfacing hips with 2,123 registered and hemiarthroplasty with 79 registered.

Number of operations by year



Data Analysis

Total hip arthroplasty

| | Female | Male |
|---------------|--------|--------|
| Number | 82,598 | 71,601 |
| Percentage | 53.80 | 46.20 |
| Mean age | 68.58 | 65.87 |
| Maximum age | 100.95 | 99.97 |
| Minimum age | 13.43 | 14.64 |
| Standard dev. | 11.35 | 11.35 |

Hemiarthroplasty

| | Female | Male |
|---------------|--------|-------|
| Number | 53 | 26 |
| Percentage | 67.10 | 32.90 |
| Mean age | 85.10 | 84.43 |
| Maximum age | 101.16 | 97.54 |
| Minimum age | 66.02 | 63.97 |
| Standard dev. | 7.60 | 8.77 |

Resurfacing hip arthroplasty

| | Female | Male |
|---------------|--------|-------|
| Number | 262 | 1,861 |
| Percentage | 12.34 | 87.66 |
| Mean age | 50.07 | 52.50 |
| Maximum age | 65.88 | 81.44 |
| Minimum age | 25.72 | 17.74 |
| Standard dev. | 7.23 | 8.63 |

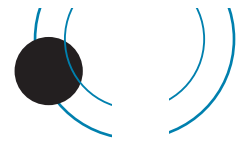
Body Mass Index

For the eleven- year period 2010 – 2020 there were 64,571 BMI registrations for primary hip replacements. The average was 29 with a range of 14 – 65 and a standard deviation of 5.70.

Data form analysis includes new form and legacy data and is for total hip replacement.

Previous operation

| | |
|-------------------|---------|
| None | 148,275 |
| Internal fixation | 2,676 |
| Osteotomy | 748 |
| Arthrodesis | 100 |
| Hip arthroscopy | 4 |



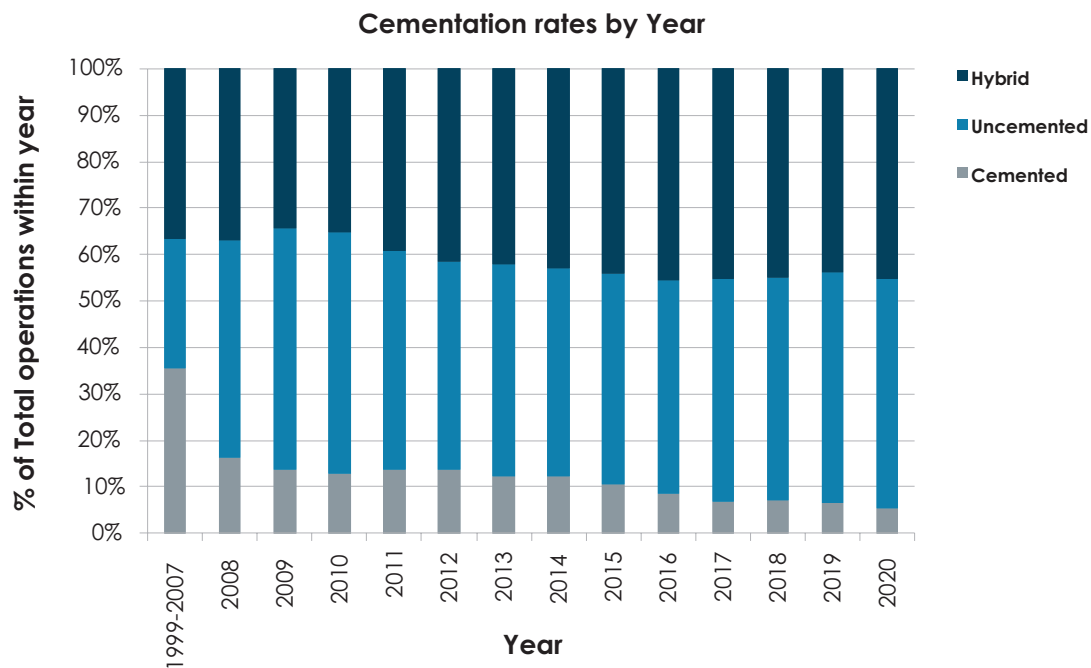
Diagnosis

| | |
|--|---------|
| Osteoarthritis | 135,781 |
| Rheumatoid arthritis/other inflammatory | 2,767 |
| Acute fracture NOF | 5,995 |
| Old fracture NOF | 1,754 |
| Avascular necrosis | 4,550 |
| Developmental dysplasia/congenital dislocation | 3,142 |
| Tumour | 707 |
| Post-acute dislocation | 365 |

Approach

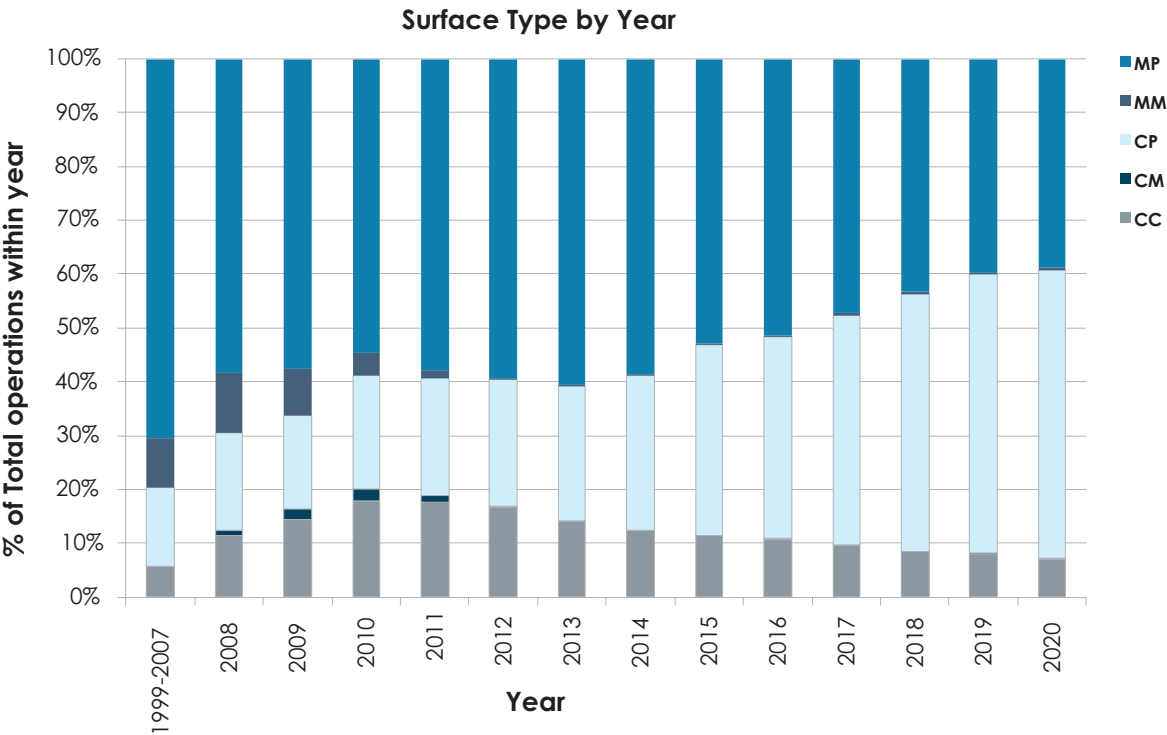
| | |
|--------------------------------|---------|
| Posterior | 103,500 |
| Anterior | 5,285 |
| Superior | 3 |
| Lateral | 35,242 |
| Trans-trochanteric (osteotomy) | 226 |

Comparison of proportions of cemented vs uncemented vs hybrid by year

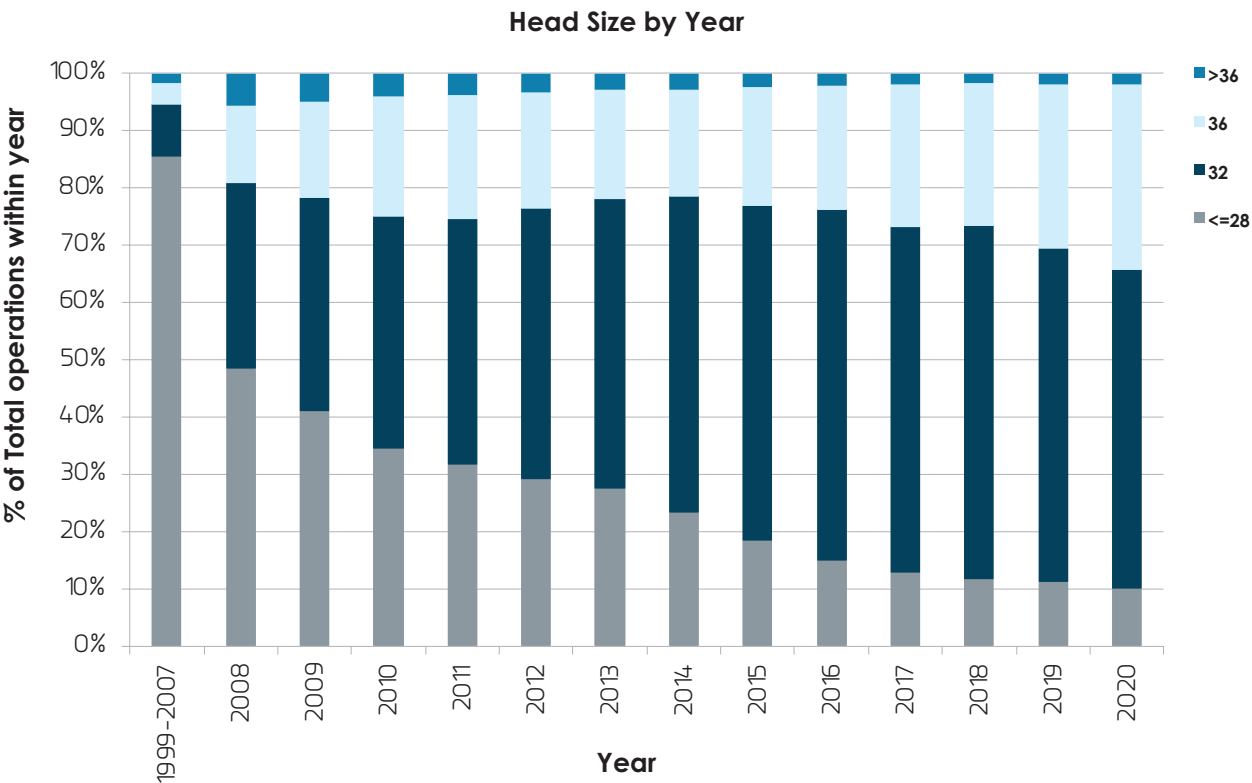


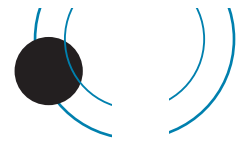


Comparison of different bearing surface usage over time

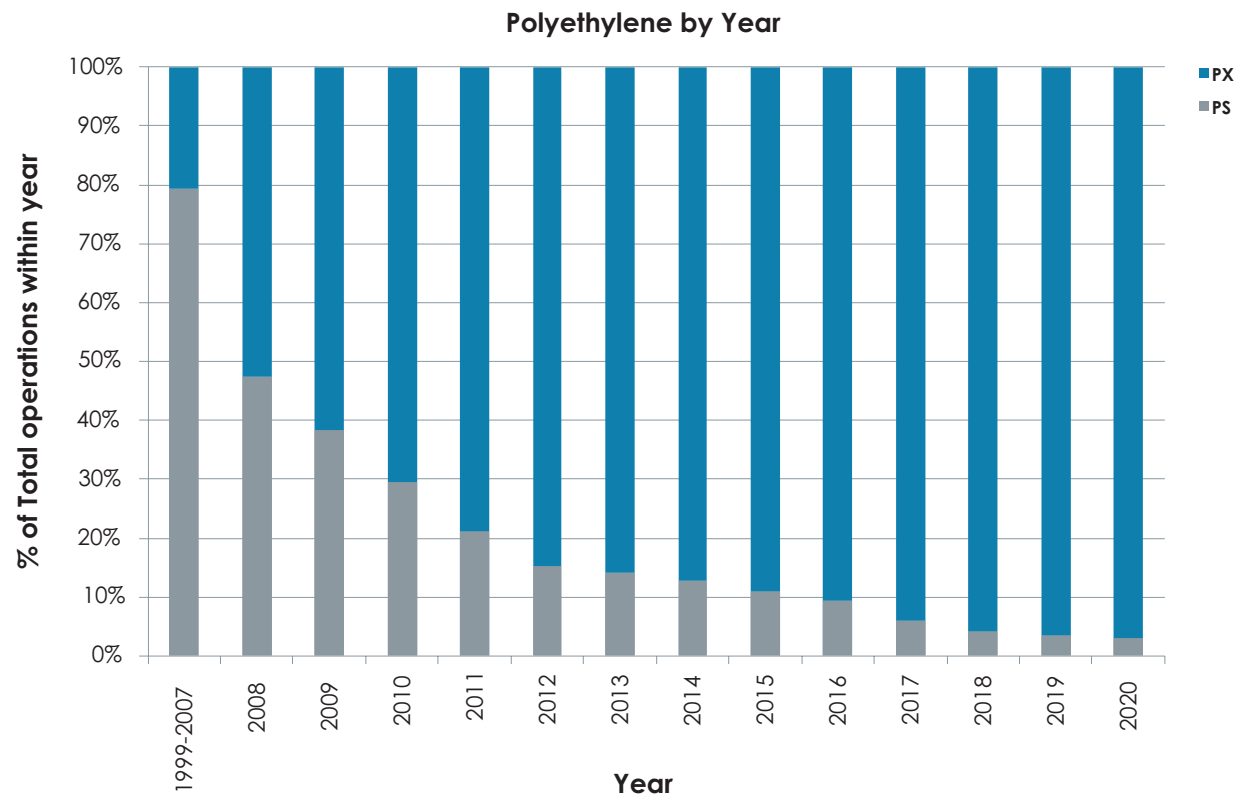


Comparison of head size usage over time





Comparison usage of standard vs cross linked polyethylene over time



Surgical Adjuncts

| | |
|---------------------|-----|
| Computer navigation | 682 |
| Robotic assisted | - |

Systemic antibiotic prophylaxis

| | |
|--|---------------|
| Patient number receiving at least one systemic antibiotic: | 148,309 (96%) |
|--|---------------|

Operating theatre

| | |
|--------------|--------|
| Conventional | 93,971 |
| Laminar flow | 57,953 |

Surgeon Attire

| | |
|------------------------|--------|
| Space suits/Helmet Fan | 44,953 |
| One-piece Toga | 203 |
| Sterile Hood and Gown | 92 |
| Conventional Gown | 364 |

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 16 year period 2005 – 2020, there were 120,274 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 16 year period 2005 – 2020.

| | |
|-------------------------------|---------|
| Consultant | 108,686 |
| Advanced trainee supervised | 10,509 |
| Advanced trainee unsupervised | 3,280 |
| Basic trainee | 2,151 |

Prosthesis usage

Total hips

Top ten femoral components used in 2020

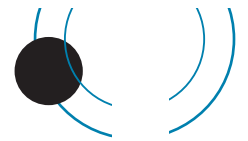
| | |
|----------------------|-------|
| Exeter V40 | 3,355 |
| Corail | 1,631 |
| Accolade II | 615 |
| C-stem AMT | 370 |
| MS 30 | 370 |
| Polarstem uncemented | 343 |
| Echo Bi-Metric | 331 |
| Taperloc Complete | 321 |
| Stemsys | 271 |
| CLS | 242 |

Top ten acetabular components used in 2020

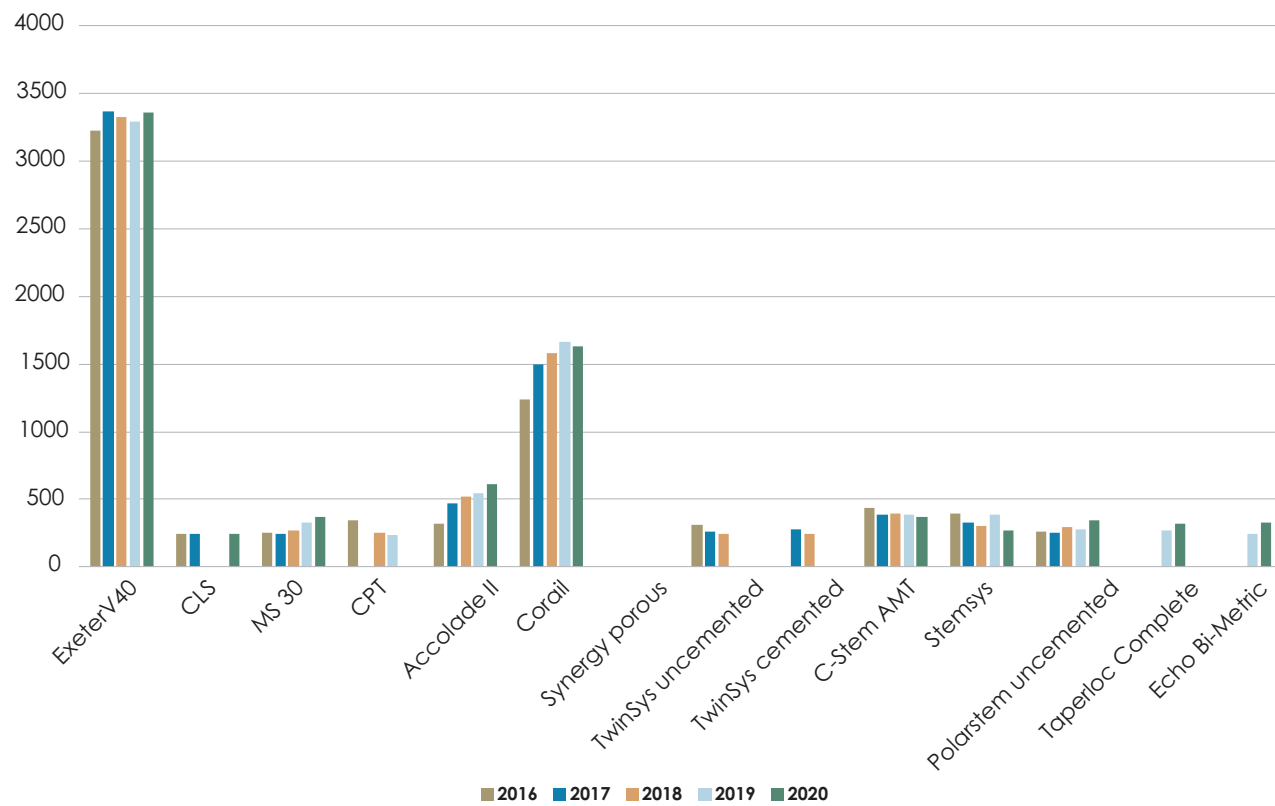
| | |
|----------------------|-------|
| Pinnacle | 2,502 |
| Trident | 1,458 |
| RM Pressfit cup | 901 |
| Continuum TM | 689 |
| G7 acetabular | 659 |
| Tritanium | 465 |
| Trident II Tritanium | 400 |
| R3 porous | 347 |
| Fitmore | 342 |
| Exeter X3 | 297 |

Top ten combinations used in 2020

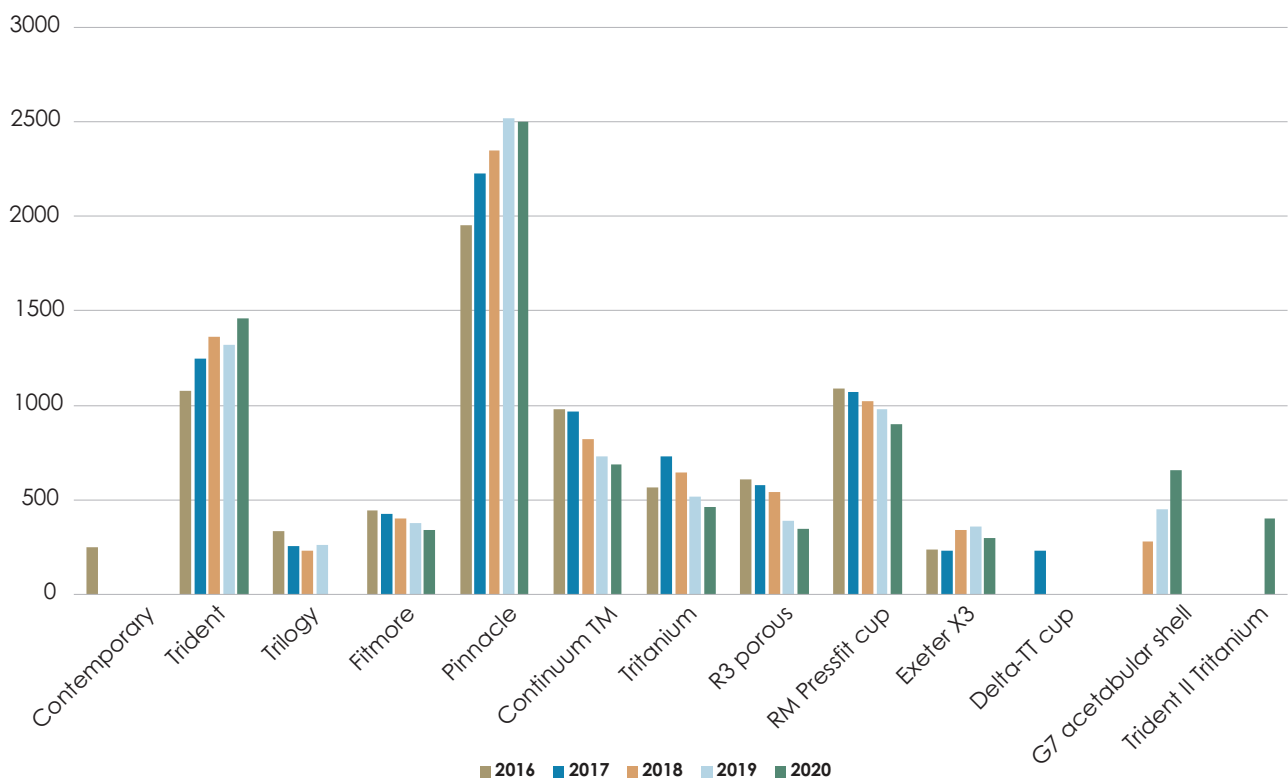
| Femur | Acetabulum | All Years | 2020 |
|----------------------|----------------------|-----------|-------|
| Corail | Pinnacle | 13,448 | 1,528 |
| Exeter V40 | Trident | 12,521 | 1,093 |
| Exeter V40 | Pinnacle | 3,161 | 348 |
| C-Stem AMT | Pinnacle | 3,036 | 344 |
| Exeter V40 | Trident II Tritanium | 523 | 321 |
| Echo Bi-Metric | G7 acetabular | 840 | 298 |
| Exeter V40 | Exeter X3 | 2,751 | 295 |
| Exeter V40 | RM Pressfit cup | 2,935 | 287 |
| Exeter V40 | Tritanium | 3,713 | 282 |
| Polarstem uncemented | R3 porous | 2,014 | 271 |



Most used femoral components per year for the five years 2016- 2020



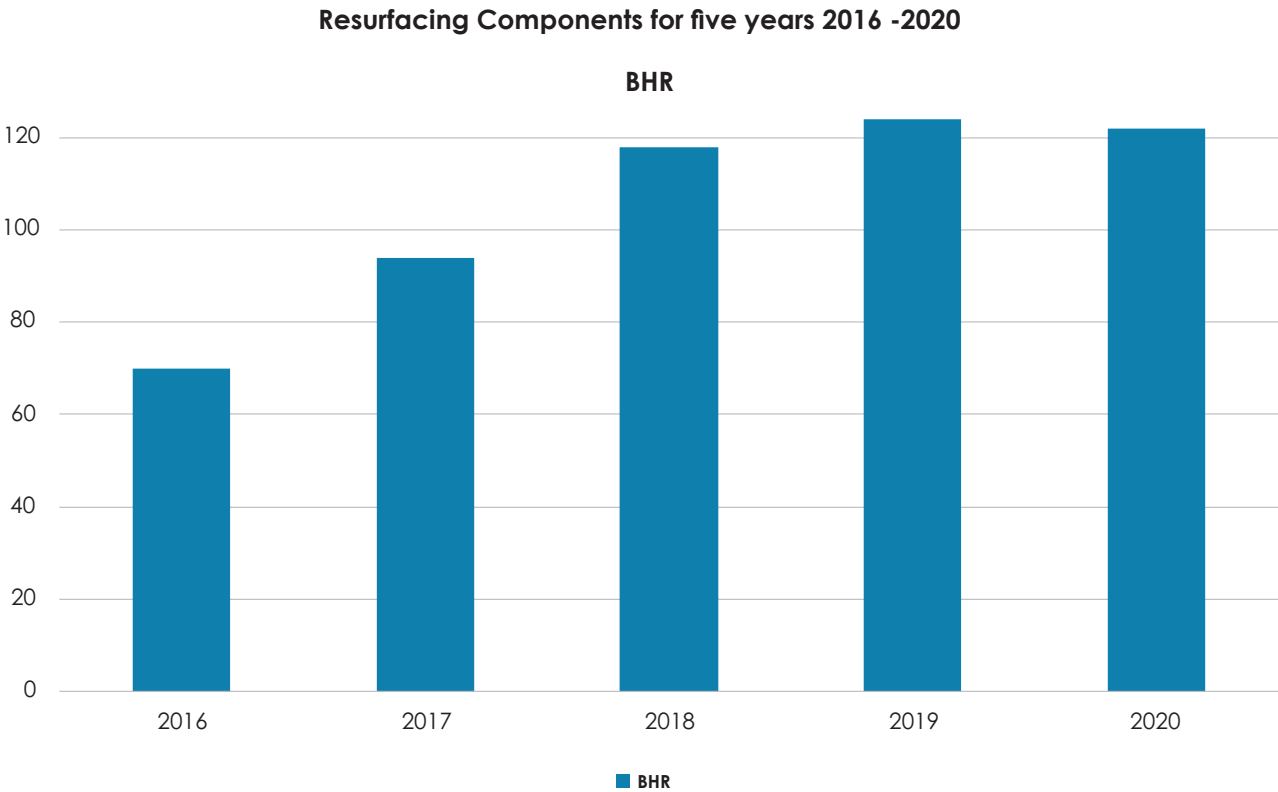
Most used acetabular components per year for the five years 2016 – 2020





Resurfacing hips components used in 2020

| | |
|-----|-----|
| BHR | 122 |
|-----|-----|



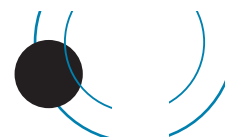
Surgeon and Hospital Workload

Surgeons

In 2020, 241 surgeons performed 9,353 total hip replacements, an average of 39 procedures per surgeon.

Hospitals

In 2020, 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.

Procedures where all components are removed (e.g. Girdlestone, ankle fusion post failed ankle replacement, or removal of components and insertion of a cement spacer for infection) are all recorded as revisions.

Data analysis

For the twenty-two year period January 1999 – December 2020, there were 21,706 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 | 10,459 | 11,247 |
| Percentage | 48.18 | 51.82 |
| Mean age | 70.67 | 70.13 |
| Maximum age | 100.28 | 99.83 |
| Minimum age | 17.52 | 20.57 |
| Standard dev. | 11.57 | 11.00 |

Body Mass Index

For the 11- year period 2010 – 2020, there were 4,086 BMI registrations for revision hip replacements. The average BMI was 29 with a range of 14- 55.

REVISION OF REGISTERED TOTAL HIP ARTHROPLASTIES

This section analyses data for revisions of registered total hip arthroplasties for the twenty- two year period.

Total hip arthroplasty

Time to revision – days

| | |
|---------|------------------|
| Average | 2,256 (6.5years) |
| Maximum | 7,796 |
| Minimum | 0 |

Reason for revision

| | |
|--------------------------------|-------|
| Dislocation/instability | 1,703 |
| Loosening acetabular component | 1,704 |
| Loosening femoral component | 1,366 |
| Unexplained pain | 1,160 |
| Deep infection | 1,097 |
| Fracture femur | 1,029 |

Analysis of the six main reasons for revision by year after total hip replacement

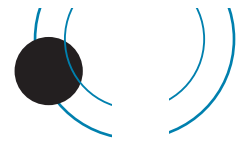
| Years | Dislocation | | Loosening Acetabular | | Loosening Femoral | | Deep infection | | Pain | | Fracture Femur | |
|--------------|--------------|------------|----------------------|------------|-------------------|------------|----------------|------------|--------------|------------|----------------|------------|
| 0 | 708 | 41.6 | 184 | 10.8 | 122 | 8.9 | 503 | 45.9 | 95 | 8.2 | 320 | 31.1 |
| 1 | 186 | 10.9 | 86 | 5.0 | 93 | 6.8 | 116 | 10.6 | 114 | 9.8 | 61 | 5.9 |
| 2 | 146 | 8.6 | 84 | 4.9 | 86 | 6.3 | 96 | 8.8 | 97 | 8.4 | 54 | 5.2 |
| 3 | 107 | 6.3 | 93 | 5.5 | 86 | 6.3 | 56 | 5.1 | 76 | 6.6 | 49 | 4.8 |
| 4 | 76 | 4.5 | 75 | 4.4 | 73 | 5.3 | 43 | 3.9 | 74 | 6.4 | 60 | 5.8 |
| 5 | 76 | 4.5 | 82 | 4.8 | 73 | 5.3 | 42 | 3.8 | 83 | 7.2 | 49 | 4.8 |
| 6 | 67 | 3.9 | 97 | 5.7 | 98 | 7.2 | 31 | 2.8 | 71 | 6.1 | 43 | 4.2 |
| 7 | 47 | 2.8 | 88 | 5.2 | 90 | 6.6 | 32 | 2.9 | 58 | 5.0 | 43 | 4.2 |
| 8 | 59 | 3.5 | 103 | 6.0 | 79 | 5.8 | 35 | 3.2 | 67 | 5.8 | 49 | 4.8 |
| 9 | 38 | 2.2 | 122 | 7.2 | 76 | 5.6 | 34 | 3.1 | 62 | 5.3 | 55 | 5.3 |
| 10 | 33 | 1.9 | 90 | 5.3 | 95 | 7.0 | 23 | 2.1 | 60 | 5.2 | 51 | 5.0 |
| >10 | 160 | 9.4 | 600 | 35.2 | 395 | 28.9 | 86 | 7.8 | 303 | 26.1 | 195 | 19.0 |
| Total | 1,703 | 100 | 1,704 | 100 | 1,366 | 100 | 1,097 | 100 | 1,160 | 100 | 1,029 | 100 |

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

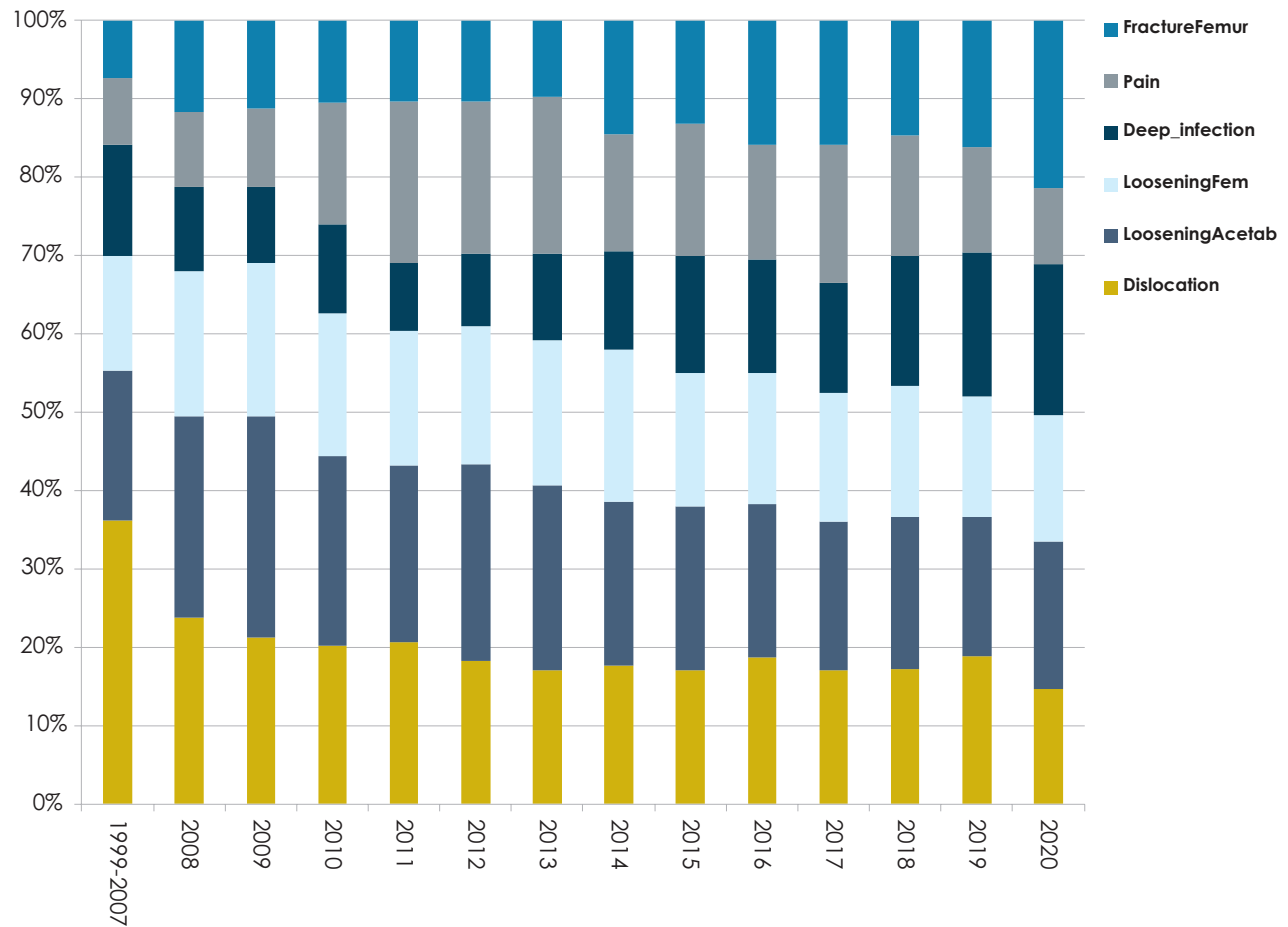
| | Dislocation | Loosening Acetabular | Loosening Femoral | Deep infection | Pain | Fracture Femur |
|------------------|-------------|----------------------|-------------------|----------------|------|----------------|
| 1999-2007 | 450 | 239 | 182 | 177 | 106 | 91 |
| 2008 | 82 | 88 | 64 | 37 | 33 | 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 | 114 | 99 | 84 | 106 | 95 |
| 2018 | 101 | 114 | 99 | 97 | 91 | 86 |
| 2019 | 131 | 123 | 107 | 127 | 94 | 112 |
| 2020 | 80 | 103 | 88 | 105 | 53 | 117 |

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 | 37.8 | 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 | 16.4 | 18.4 | 15.9 | 13.5 | 17.1 | 15.3 |
| 2018 | 16.1 | 18.1 | 15.7 | 15.4 | 14.5 | 13.7 |
| 2019 | 18.6 | 17.5 | 15.2 | 18.1 | 13.4 | 15.9 |
| 2020 | 14.3 | 18.4 | 15.7 | 18.8 | 9.5 | 20.9 |



Comparison of the 6 main reasons for revision over time





RESURFACED HIP ANALYSES

There were 2,123 resurfacing hips registered for the period 2000 – 2020, with 168 revised.

Time to revision for resurfaced hips

| | |
|---------|------------------------|
| Average | 2,133 days (6.6 years) |
| Maximum | 5,505 days |
| Minimum | 10 days |

Reason for revision

| | |
|-----------------------------|----|
| Pain | 54 |
| Loosening acetabulum | 18 |
| Deep infection | 17 |
| Loosening femoral component | 18 |
| Fracture femur | 20 |
| Dislocation/instability | 2 |

Statistical note

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

i) Observed component years

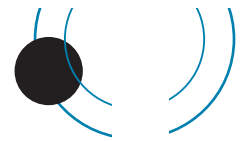
This is the number of registered primary procedures multiplied by the number of years each component has been in place.

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.

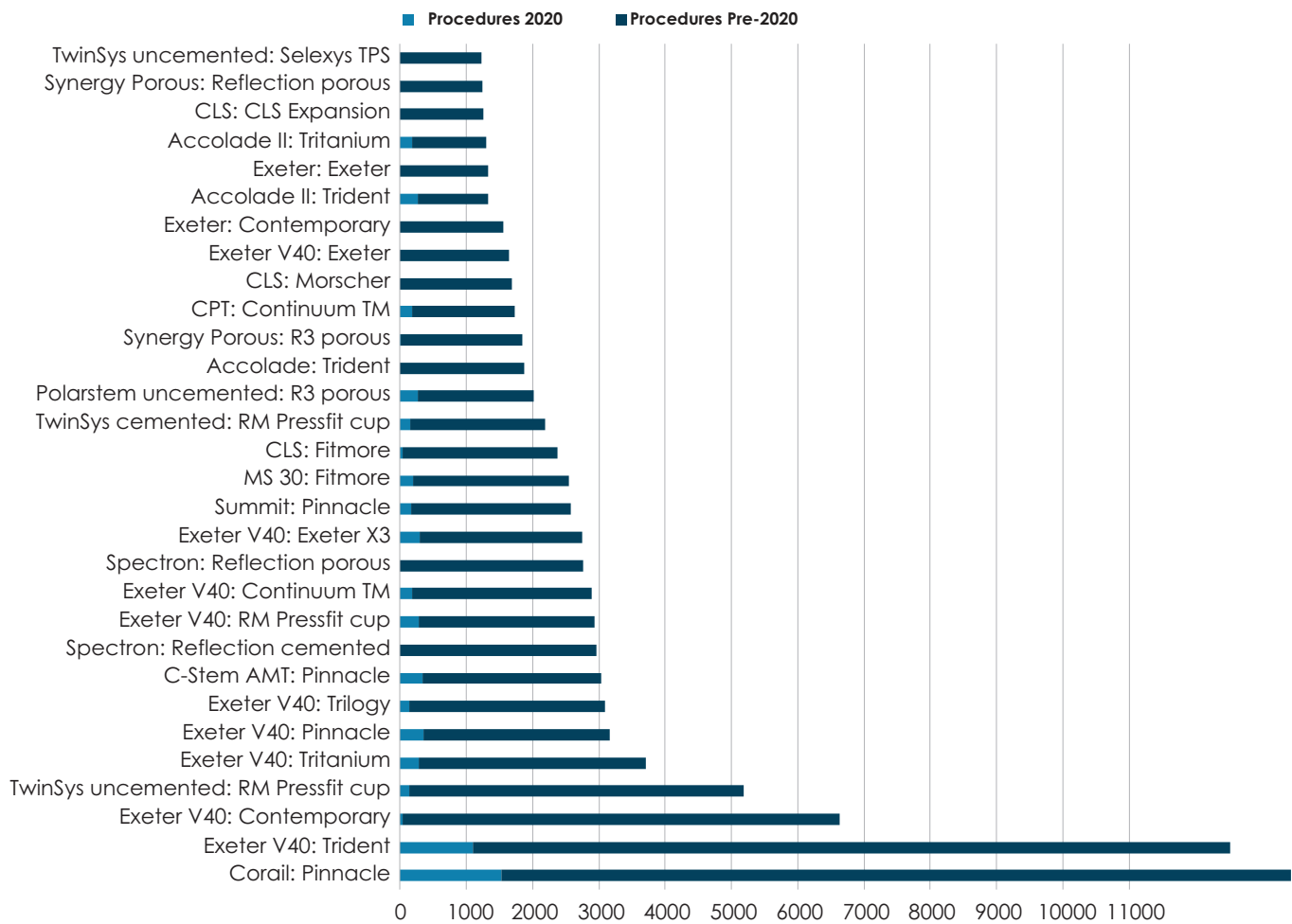
Statistical Significance

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.



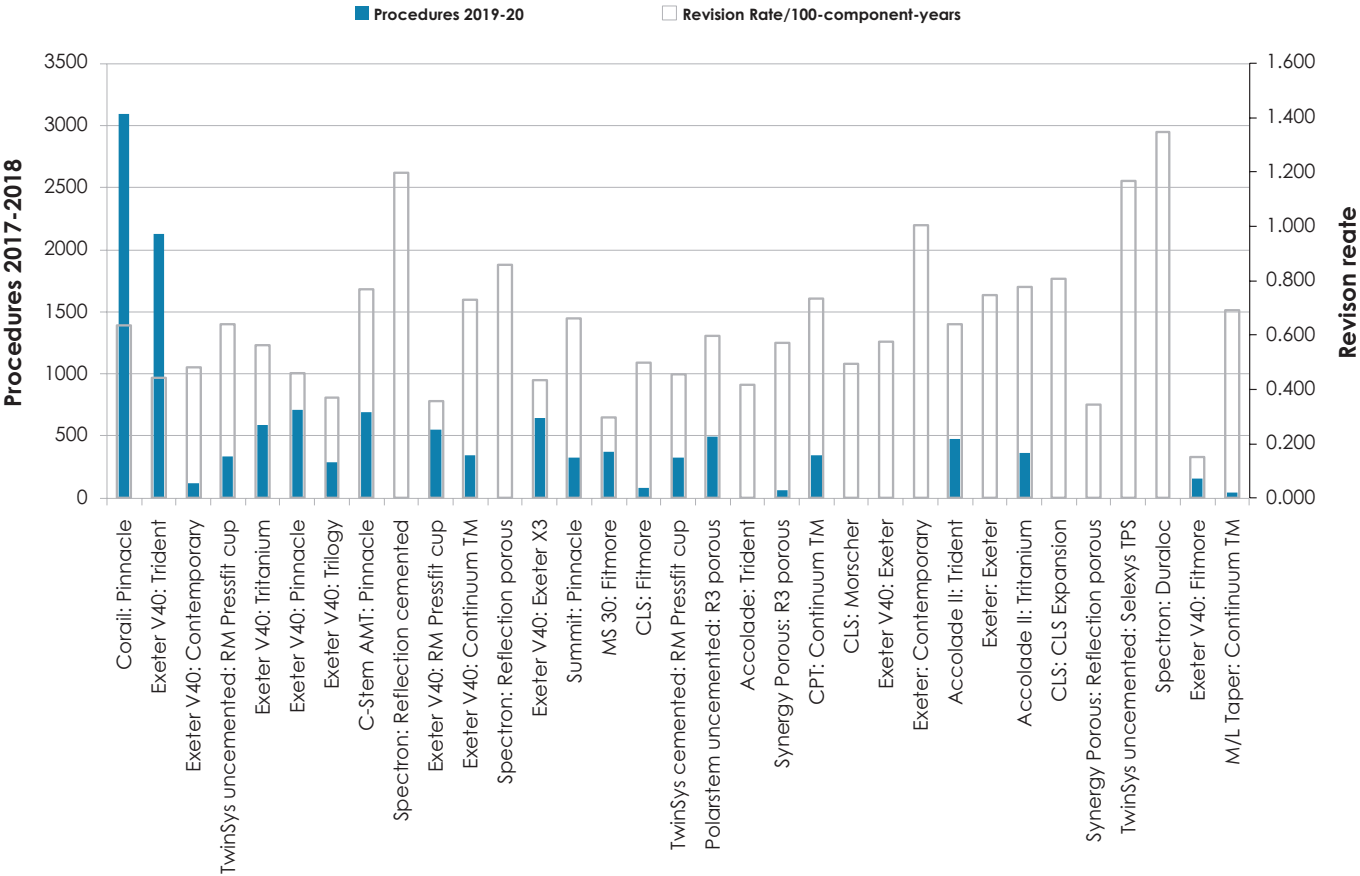
Conventional Primary Hip Arthroplasties

The figure below summarises the 30 Hip prostheses combinations with >1000 procedures, showing the number of procedures for the history of the Registry.

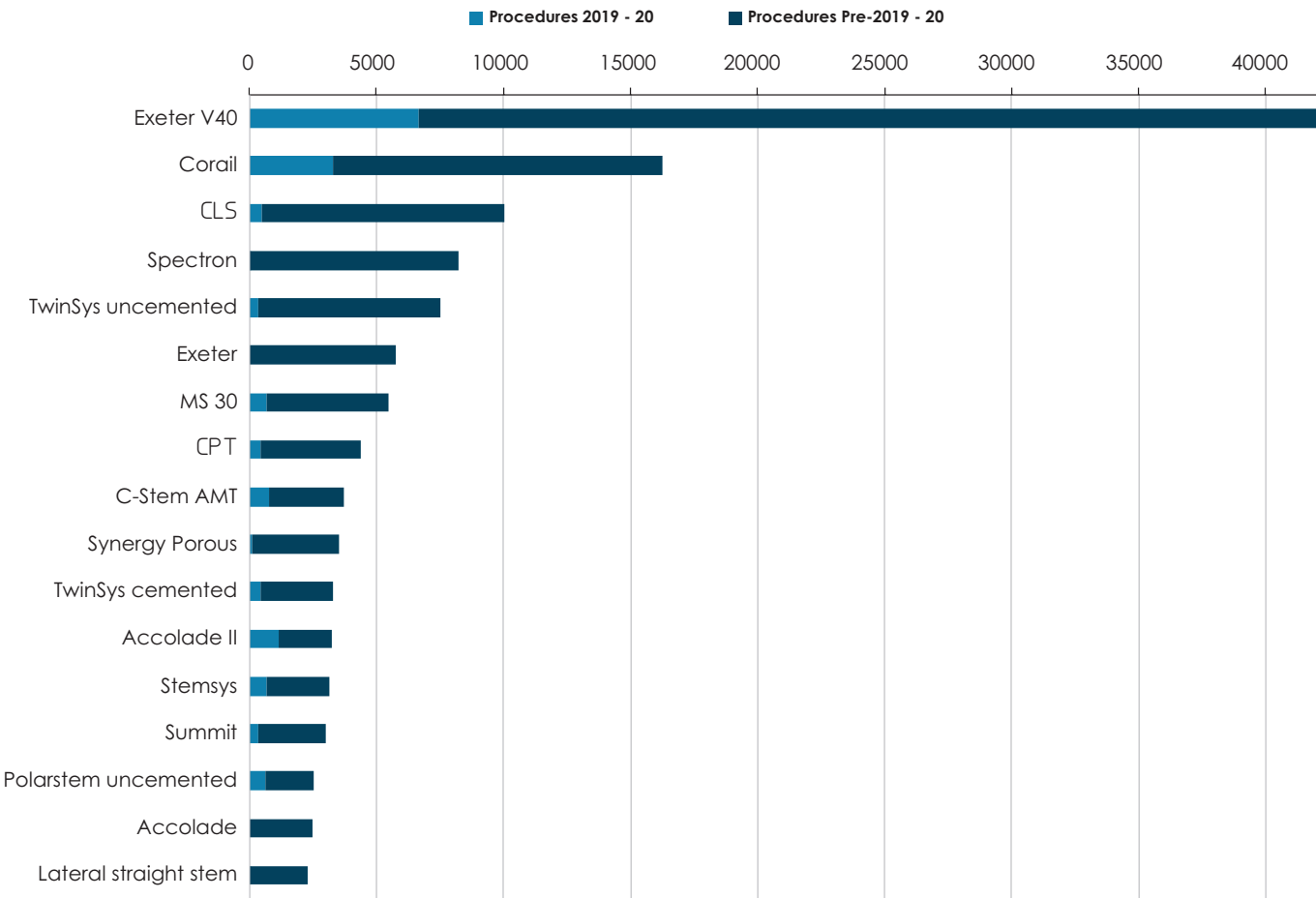


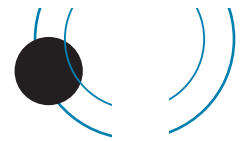


The figure below summarises the 33 Hip prostheses combinations with >1000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.

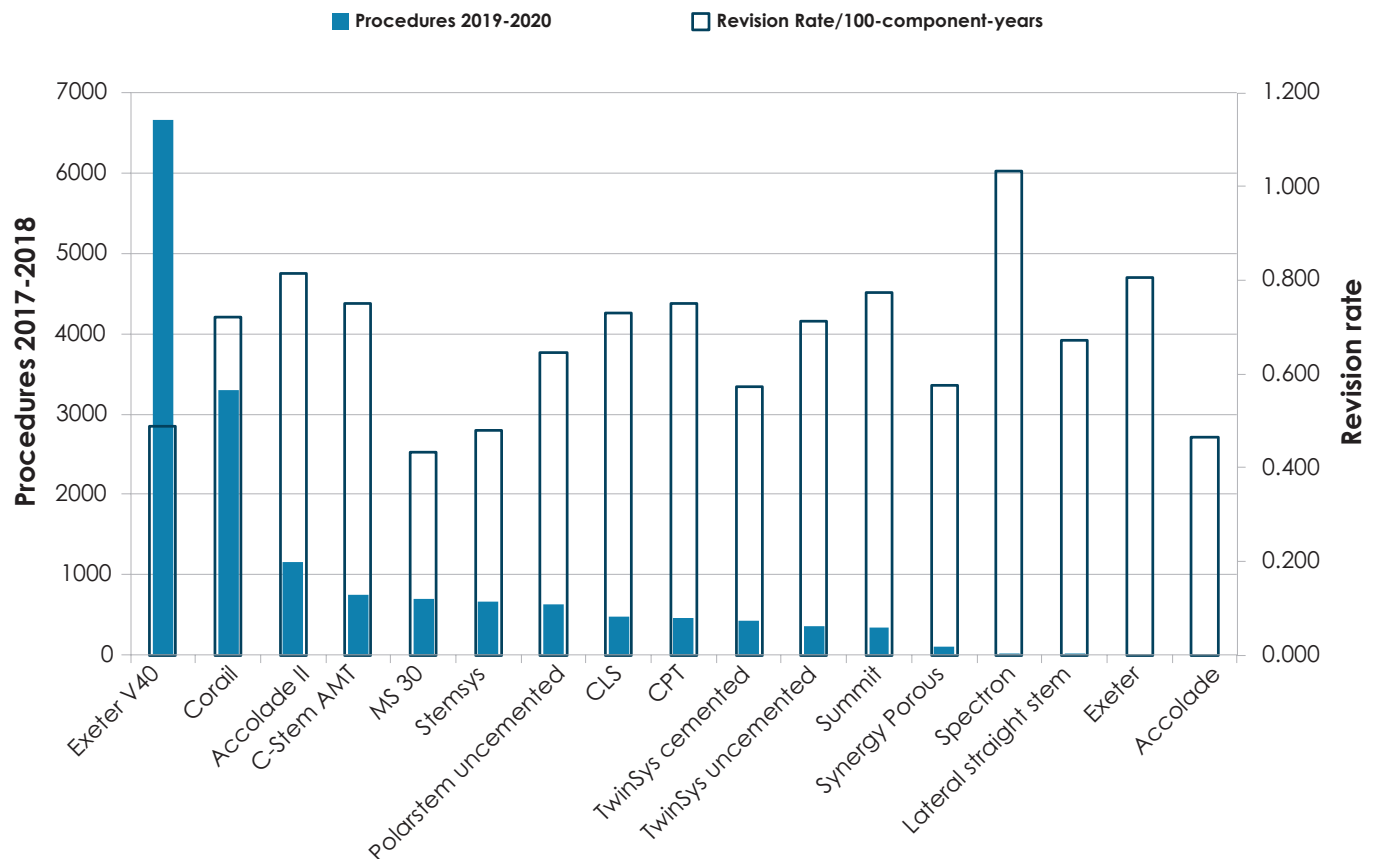


The figure below summarises the 17 Hip femur prostheses with >2000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.

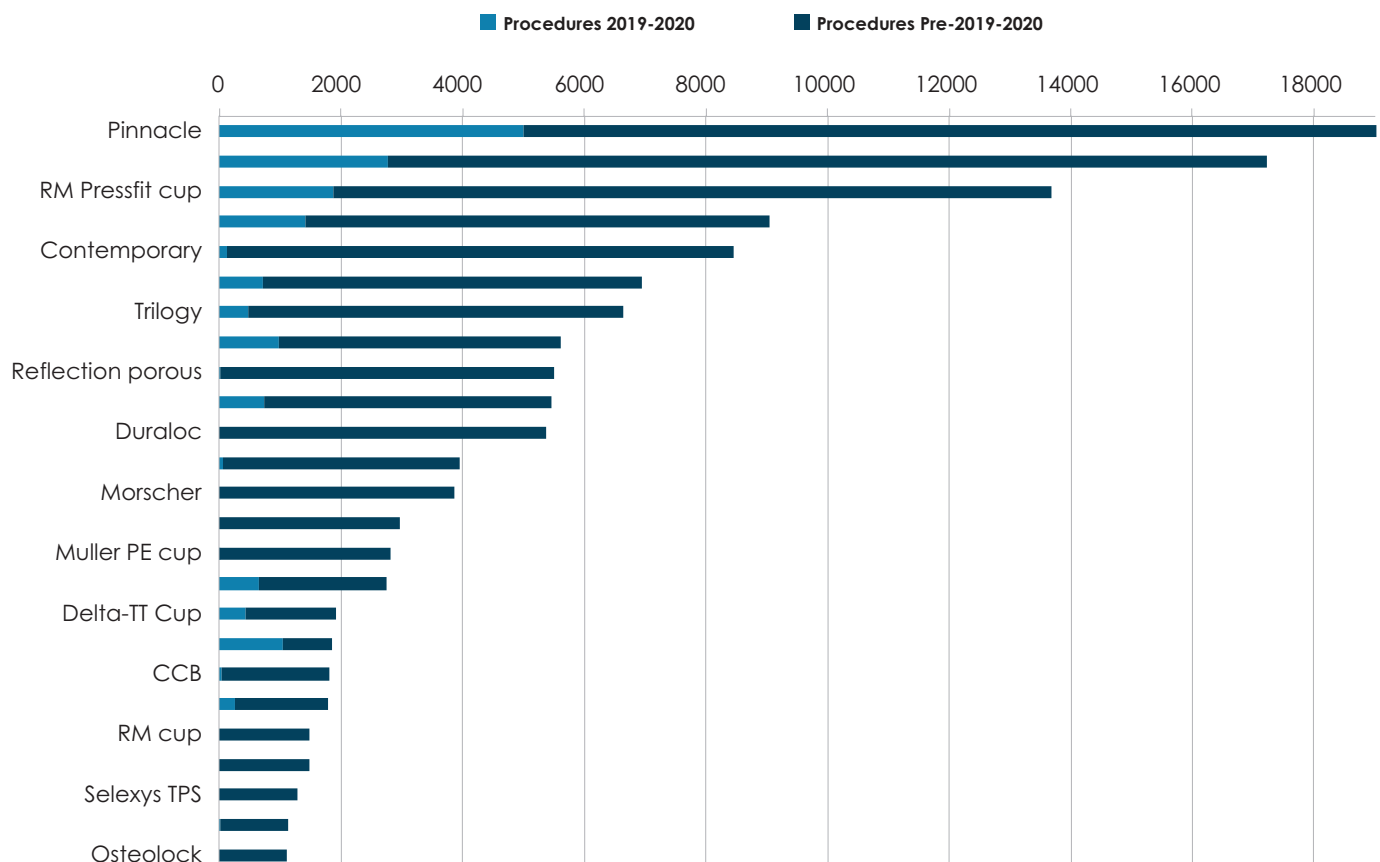




The figure below summarises the 17 Hip femur prostheses with >2000 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.

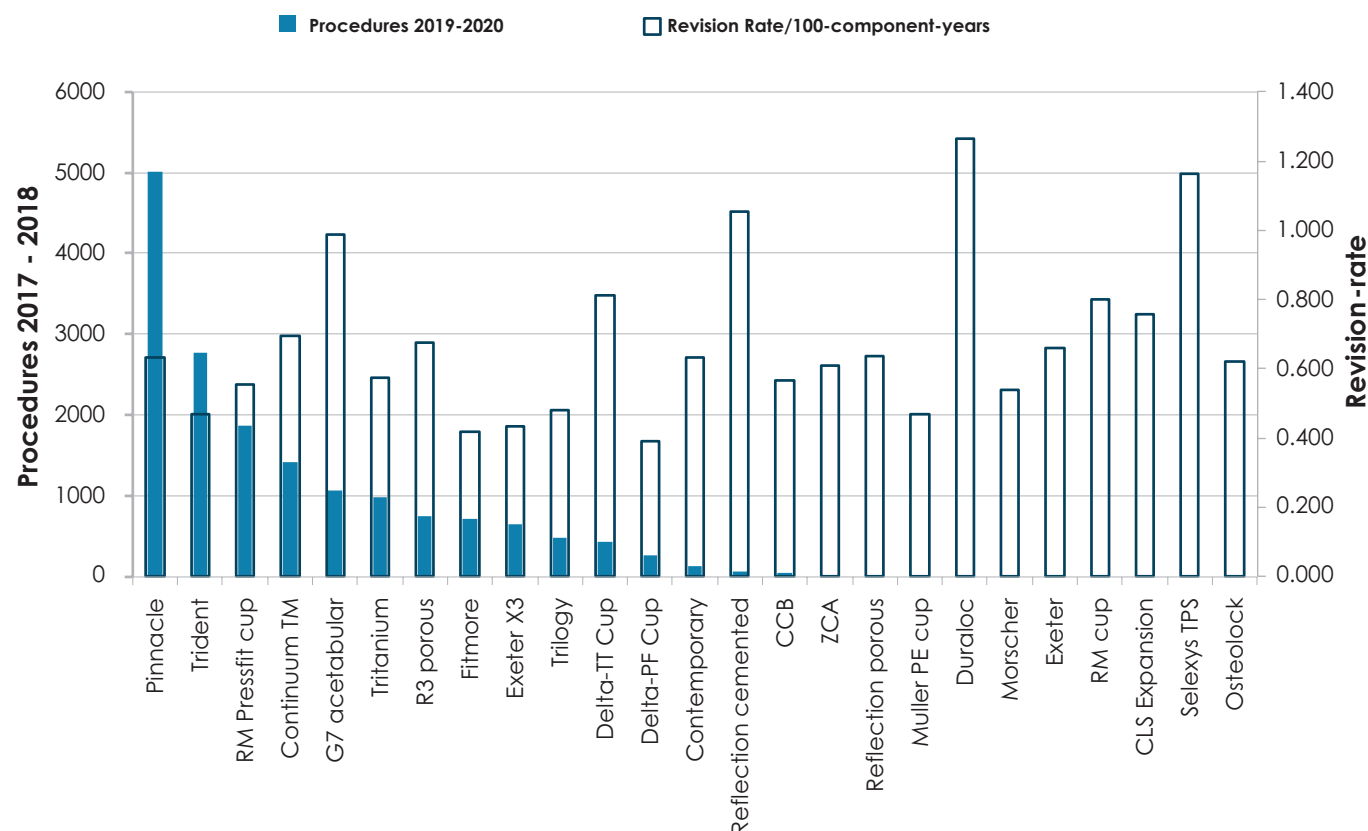


The figure below summarises the 25 Hip acetabular prostheses with >1000 procedures. Showing the number of procedures for the history of the Registry and for the previous 2 years.





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.



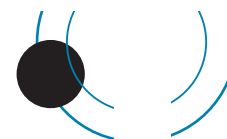
All Primary Total Hip Arthroplasties

| No. Ops. | Observed comp. Yrs | Number Revised | Rate/100-Component-years | Exact 95% Confidence Interval | |
|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| 154,199 | 1,182,282 | 8,231 | 0.70 | 0.68 | 0.71 |

Revision versus hip prostheses combinations sorted on revision rate

(Minimum of 50 primary registered arthroplasties)

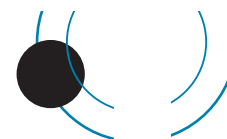
| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|-------------------|-----------------------|----------|--------------------|-------------|--------------------------|-------------------------------|-------|-----------------|
| S-Rom | ASR | 130 | 867.0 | 96 | 11.07 | 8.92 | 13.46 | 0 |
| Anthology Porous | BHR Acetabular Cup | 93 | 805.0 | 51 | 6.34 | 4.72 | 8.33 | 0 |
| Corail | ASR | 156 | 1,326.0 | 84 | 6.33 | 5.05 | 7.84 | 0 |
| Anthology Porous | R3 porous | 68 | 547.1 | 34 | 6.21 | 4.30 | 8.68 | 0 |
| Quadra-H | Acetabular Shell | 207 | 173.4 | 8 | 4.61 | 1.81 | 8.71 | 119 |
| Summit | ASR | 88 | 830.1 | 38 | 4.58 | 3.24 | 6.28 | 0 |
| Taperloc Complete | Trident | 56 | 23.5 | 1 | 4.25 | 0.11 | 23.66 | 50 |
| Synergy Porous | BHR Acetabular Cup | 114 | 1,160.6 | 42 | 3.62 | 2.61 | 4.89 | 0 |
| CLS | Artek | 59 | 762.2 | 26 | 3.41 | 2.18 | 4.92 | 0 |
| MS 30 | G7 acetabular | 92 | 59.7 | 2 | 3.35 | 0.41 | 12.10 | 68 |
| Accolade II | Continuum TM | 159 | 210.2 | 7 | 3.33 | 1.34 | 6.86 | 56 |
| Metafix | Trinity | 82 | 95.8 | 3 | 3.13 | 0.65 | 9.15 | 47 |
| CLS | Durom | 198 | 2,186.5 | 68 | 3.11 | 2.42 | 3.94 | 0 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|------------------------|----------|--------------------|-------------|--------------------------|-------------------------------|-------|-----------------|
| Accolade II | Trident II Tritanium | 80 | 68.0 | 2 | 2.94 | 0.36 | 10.62 | 52 |
| CPT | G7 acetabular | 109 | 240.8 | 7 | 2.91 | 1.04 | 5.71 | 26 |
| ABG | Duraloc | 116 | 1,976.9 | 44 | 2.23 | 1.62 | 2.99 | 0 |
| TwinSys cemented | Pinnacle | 119 | 454.6 | 10 | 2.20 | 0.98 | 3.90 | 19 |
| ABGII | RM Pressfit cup | 91 | 384.6 | 8 | 2.08 | 0.90 | 4.10 | 0 |
| Lateral straight stem | Trilogy | 69 | 625.5 | 13 | 2.08 | 1.11 | 3.55 | 0 |
| ABGII | Duraloc | 139 | 2,087.2 | 43 | 2.06 | 1.49 | 2.78 | 0 |
| H-Max C | Delta-TT Cup | 110 | 280.8 | 5 | 1.78 | 0.58 | 4.16 | 21 |
| Accolade II | RM Pressfit cup | 134 | 309.8 | 5 | 1.61 | 0.52 | 3.77 | 39 |
| Elite plus | Duraloc | 608 | 7,574.4 | 122 | 1.61 | 1.34 | 1.92 | 0 |
| Prodigy | Duraloc | 113 | 1,561.5 | 25 | 1.60 | 1.04 | 2.36 | 0 |
| Exeter | Duraloc | 553 | 8,252.5 | 120 | 1.45 | 1.21 | 1.74 | 0 |
| CBC | Expansys shell | 183 | 2,008.4 | 29 | 1.44 | 0.97 | 2.07 | 0 |
| Quadra-C | Acetabular Shell | 150 | 143.9 | 2 | 1.39 | 0.17 | 5.02 | 85 |
| M/L Taper | Delta-TT Cup | 64 | 432.0 | 6 | 1.39 | 0.51 | 3.02 | 0 |
| ABG | ABGII | 72 | 1,171.5 | 16 | 1.37 | 0.78 | 2.22 | 0 |
| CLS | RM cup | 113 | 1,318.4 | 18 | 1.37 | 0.81 | 2.16 | 0 |
| Taperloc Complete | Continuum TM | 242 | 445.3 | 6 | 1.35 | 0.43 | 2.78 | 62 |
| Spectron | Duraloc | 1,152 | 14,568.4 | 196 | 1.35 | 1.16 | 1.54 | 0 |
| CCA SS | Contemporary | 74 | 771.1 | 10 | 1.30 | 0.62 | 2.38 | 0 |
| MasterSL | Delta-TT Cup | 117 | 233.3 | 3 | 1.29 | 0.27 | 3.76 | 26 |
| Contemporary | Contemporary | 71 | 946.7 | 12 | 1.27 | 0.65 | 2.21 | 0 |
| H-Max M | Delta-PF Cup | 71 | 637.0 | 8 | 1.26 | 0.54 | 2.47 | 0 |
| Mallory-Head | M2A | 105 | 1,389.4 | 17 | 1.22 | 0.69 | 1.91 | 0 |
| Accolade II | Fitmore | 87 | 164.7 | 2 | 1.21 | 0.15 | 4.39 | 23 |
| Spectron | Reflection cemented | 2,958 | 31,048.2 | 372 | 1.20 | 1.08 | 1.33 | 0 |
| Spectron | Muller PE cup | 66 | 677.3 | 8 | 1.18 | 0.51 | 2.33 | 0 |
| TwinSys uncemented | Selexys TPS | 1,231 | 12,415.1 | 145 | 1.17 | 0.99 | 1.37 | 0 |
| AML MMA | Duraloc | 74 | 1,124.1 | 13 | 1.16 | 0.62 | 1.98 | 0 |
| CLS | Duraloc | 699 | 9,896.4 | 114 | 1.15 | 0.95 | 1.38 | 0 |
| Spectron | Morscher | 210 | 2,953.0 | 33 | 1.12 | 0.76 | 1.55 | 0 |
| Exeter V40 | Trabecular Metal Shell | 241 | 1,367.4 | 15 | 1.10 | 0.59 | 1.76 | 19 |
| TwinSys cemented | Selexys TPS | 65 | 549.4 | 6 | 1.09 | 0.40 | 2.38 | 0 |
| AML | Duraloc | 53 | 837.9 | 9 | 1.07 | 0.49 | 2.04 | 0 |
| CLS | Allofit | 192 | 2,204.9 | 23 | 1.04 | 0.66 | 1.57 | 0 |
| Avenir Muller uncemented | Continuum TM | 182 | 1,354.8 | 14 | 1.03 | 0.56 | 1.73 | 0 |
| S-Rom | Ultima | 78 | 1,372.8 | 14 | 1.02 | 0.56 | 1.71 | 0 |
| Exeter V40 | Duraloc | 987 | 11,851.2 | 120 | 1.01 | 0.84 | 1.21 | 0 |



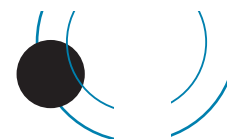
| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|------------------------|-----------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|-----------------|
| Exeter | Contemporary | 1,551 | 18,983.3 | 191 | 1.01 | 0.87 | 1.16 | 0 |
| C-Stem | Pinnacle | 85 | 399.4 | 4 | 1.00 | 0.27 | 2.56 | 0 |
| Friendly | Delta-TT Cup | 68 | 521.2 | 5 | 0.96 | 0.31 | 2.24 | 0 |
| Echo Bi-Metric | Continuum TM | 147 | 417.2 | 4 | 0.96 | 0.26 | 2.45 | 24 |
| Corail | Duraloc | 464 | 5,730.5 | 54 | 0.94 | 0.71 | 1.23 | 0 |
| S-Rom | Pinnacle | 389 | 4,283.5 | 40 | 0.93 | 0.66 | 1.26 | 8 |
| MS 30 | Contemporary | 128 | 1,296.2 | 12 | 0.93 | 0.48 | 1.62 | 0 |
| CPT | Tritanium | 85 | 759.6 | 7 | 0.92 | 0.37 | 1.90 | 0 |
| ABGII | Trident | 342 | 4,558.3 | 42 | 0.92 | 0.65 | 1.23 | 0 |
| Exeter V40 | Trident II Tritanium | 523 | 436.3 | 4 | 0.92 | 0.25 | 2.35 | 321 |
| TwinSys uncemented | RM cup | 122 | 1,227.4 | 11 | 0.90 | 0.45 | 1.60 | 0 |
| Corail | RM Pressfit cup | 163 | 787.4 | 7 | 0.89 | 0.36 | 1.83 | 10 |
| CPT | Fitmore | 195 | 1,358.6 | 12 | 0.88 | 0.46 | 1.54 | 0 |
| C-Stem | Duraloc | 53 | 679.4 | 6 | 0.88 | 0.32 | 1.92 | 0 |
| Taperloc Complete | G7 acetabular | 431 | 1,020.3 | 9 | 0.88 | 0.40 | 1.67 | 107 |
| Corail | Fitmore | 333 | 1,475.3 | 13 | 0.88 | 0.47 | 1.51 | 26 |
| SL modular stem | RM cup | 322 | 4,878.7 | 42 | 0.86 | 0.62 | 1.16 | 0 |
| Spectron | Reflection porous | 2,755 | 30,457.4 | 261 | 0.86 | 0.75 | 0.97 | 0 |
| MS 30 | Duraloc | 55 | 824.9 | 7 | 0.85 | 0.30 | 1.67 | 0 |
| Exeter V40 | G7 acetabular | 310 | 591.1 | 5 | 0.85 | 0.27 | 1.97 | 105 |
| Wagner cone stem | Continuum TM | 55 | 237.3 | 2 | 0.84 | 0.10 | 3.04 | 4 |
| H-Max S | Delta-TT Cup | 898 | 4,435.9 | 37 | 0.83 | 0.59 | 1.15 | 72 |
| Echo Bi-Metric | G7 acetabular | 840 | 1,803.8 | 15 | 0.83 | 0.44 | 1.34 | 298 |
| CPT | Trilogy | 850 | 7,485.0 | 62 | 0.83 | 0.64 | 1.06 | 0 |
| CPT | Delta-TT Cup | 117 | 366.0 | 3 | 0.82 | 0.17 | 2.40 | 14 |
| Stemsys | Agilis Ti-por | 545 | 2,463.0 | 20 | 0.81 | 0.50 | 1.25 | 31 |
| CLS | CLS Expansion | 1,262 | 17,303.9 | 140 | 0.81 | 0.68 | 0.95 | 0 |
| Taperloc Complete | RM Pressfit cup | 326 | 751.7 | 6 | 0.80 | 0.25 | 1.65 | 64 |
| Lateral straight stem | RM cup | 533 | 5,824.5 | 46 | 0.79 | 0.57 | 1.04 | 0 |
| H-Max S | Delta-PF Cup | 252 | 1,013.7 | 8 | 0.79 | 0.31 | 1.49 | 26 |
| TwinSys cemented | CCB | 454 | 2,793.5 | 22 | 0.79 | 0.49 | 1.19 | 5 |
| Furlong | Furlong | 66 | 889.6 | 7 | 0.79 | 0.32 | 1.62 | 0 |
| Accolade II | Tritanium | 1,301 | 4,498.6 | 35 | 0.78 | 0.54 | 1.08 | 175 |
| Standard straight stem | RM cup | 138 | 1,681.5 | 13 | 0.77 | 0.41 | 1.32 | 0 |
| Accolade | Muller PE cup | 114 | 1,296.9 | 10 | 0.77 | 0.34 | 1.37 | 0 |
| Optimys | RM Pressfit cup | 280 | 520.3 | 4 | 0.77 | 0.16 | 1.97 | 84 |
| C-Stem AMT | Pinnacle | 3,036 | 12,633.6 | 97 | 0.77 | 0.62 | 0.93 | 344 |
| ABGII | Delta-PF Cup | 107 | 1,442.7 | 11 | 0.76 | 0.36 | 1.32 | 0 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|--------------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|-----------------|
| CPT | Monoblock Acetabular Cup | 84 | 1,051.4 | 8 | 0.76 | 0.30 | 1.44 | 0 |
| Stemsys | Polymax | 167 | 526.5 | 4 | 0.76 | 0.21 | 1.95 | 21 |
| Charnley | Charnley Cup Ogee | 303 | 4,082.2 | 31 | 0.76 | 0.52 | 1.08 | 0 |
| Exeter | Exeter | 1,326 | 15,902.9 | 119 | 0.75 | 0.62 | 0.89 | 0 |
| CPT | Continuum TM | 1,729 | 7,742.4 | 57 | 0.74 | 0.55 | 0.95 | 177 |
| C-Stem AMT | RM Pressfit cup | 131 | 683.5 | 5 | 0.73 | 0.24 | 1.71 | 1 |
| CBC | RM Pressfit cup | 445 | 3,421.1 | 25 | 0.73 | 0.46 | 1.06 | 0 |
| Exeter V40 | Continuum TM | 2,887 | 14,944.8 | 109 | 0.73 | 0.60 | 0.88 | 177 |
| Corail | Monoblock Acetabular Cup | 95 | 1,098.8 | 8 | 0.73 | 0.31 | 1.43 | 0 |
| Polarstem uncemented | RM Pressfit cup | 133 | 138.4 | 1 | 0.72 | 0.02 | 4.03 | 66 |
| Versys cemented | ZCA | 391 | 4,464.2 | 32 | 0.72 | 0.49 | 1.01 | 0 |
| CBC | Fitmore | 59 | 703.3 | 5 | 0.71 | 0.23 | 1.66 | 0 |
| Exeter V40 | Bio-clad poly | 140 | 1,131.2 | 8 | 0.71 | 0.31 | 1.39 | 0 |
| CLS | RM Pressfit cup | 627 | 4,868.3 | 34 | 0.70 | 0.48 | 0.96 | 35 |
| M/L Taper | Continuum TM | 1,047 | 6,087.3 | 42 | 0.69 | 0.49 | 0.92 | 4 |
| Exeter V40 | R3 porous | 731 | 3,333.8 | 23 | 0.69 | 0.44 | 1.04 | 55 |
| CPT | Duraloc | 212 | 2,612.6 | 18 | 0.69 | 0.41 | 1.09 | 0 |
| Exeter | Osteolock | 836 | 11,796.1 | 80 | 0.68 | 0.54 | 0.84 | 0 |
| CLS | Trident | 165 | 2,085.6 | 14 | 0.67 | 0.35 | 1.10 | 0 |
| Summit | Pinnacle | 2,575 | 17,797.4 | 118 | 0.66 | 0.55 | 0.79 | 161 |
| Exeter V40 | PolarCup cemented | 51 | 152.8 | 1 | 0.65 | 0.00 | 3.06 | 8 |
| Elite plus | Charnley | 298 | 3,837.1 | 25 | 0.65 | 0.42 | 0.96 | 0 |
| CPT | Trident | 145 | 1,842.7 | 12 | 0.65 | 0.34 | 1.14 | 0 |
| ABGII | Pinnacle | 67 | 769.9 | 5 | 0.65 | 0.21 | 1.52 | 0 |
| Corail | Continuum TM | 334 | 1,696.3 | 11 | 0.65 | 0.32 | 1.16 | 8 |
| CPT | ZCA | 550 | 5,863.0 | 38 | 0.65 | 0.45 | 0.88 | 0 |
| Omnifit | Trident | 149 | 2,024.9 | 13 | 0.64 | 0.32 | 1.07 | 0 |
| Accolade II | Trident | 1,331 | 4,219.4 | 27 | 0.64 | 0.42 | 0.93 | 265 |
| TwinSys uncemented | RM Pressfit cup | 5,190 | 37,126.9 | 237 | 0.64 | 0.56 | 0.72 | 136 |
| Corail | Pinnacle | 13,448 | 69,990.7 | 446 | 0.64 | 0.58 | 0.70 | 1528 |
| TwinSys cemented | Continuum TM | 142 | 629.8 | 4 | 0.64 | 0.17 | 1.63 | 21 |
| C-Stem AMT | Marathon cemented | 365 | 2,213.0 | 14 | 0.63 | 0.33 | 1.03 | 10 |
| MS 30 | Morscher | 787 | 10,520.9 | 66 | 0.63 | 0.48 | 0.79 | 0 |
| Spectron | Trident | 78 | 968.8 | 6 | 0.62 | 0.20 | 1.28 | 0 |
| CLS | Trilogy | 694 | 5,337.5 | 33 | 0.62 | 0.43 | 0.87 | 40 |
| Avenir Muller uncemented | Fitmore | 69 | 323.8 | 2 | 0.62 | 0.07 | 2.23 | 1 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|--------------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|-----------------|
| CLS | Monoblock Acetabular Cup | 80 | 972.4 | 6 | 0.62 | 0.20 | 1.27 | 0 |
| Polarstem uncemented | Reflection porous | 335 | 2,605.0 | 16 | 0.61 | 0.35 | 1.00 | 0 |
| CLS | Reflection porous | 384 | 3,602.6 | 22 | 0.61 | 0.38 | 0.92 | 2 |
| Exeter | CLS Expansion | 129 | 1,654.5 | 10 | 0.60 | 0.29 | 1.11 | 0 |
| H-Max S | Trident | 59 | 165.7 | 1 | 0.60 | 0.02 | 3.36 | 4 |
| CLS | Trabecular Metal Shell | 57 | 500.8 | 3 | 0.60 | 0.12 | 1.75 | 3 |
| Trabecular Metal Stem | Continuum TM | 487 | 3,012.6 | 18 | 0.60 | 0.35 | 0.94 | 15 |
| Polarstem uncemented | R3 porous | 2,014 | 7,889.0 | 47 | 0.60 | 0.44 | 0.79 | 271 |
| CLS | Continuum TM | 899 | 4,426.0 | 26 | 0.59 | 0.37 | 0.85 | 103 |
| CLS | Tritanium | 87 | 519.0 | 3 | 0.58 | 0.12 | 1.69 | 5 |
| MS 30 | RM Pressfit cup | 90 | 868.8 | 5 | 0.58 | 0.16 | 1.26 | 0 |
| Exeter V40 | Exeter | 1,639 | 16,722.0 | 96 | 0.57 | 0.47 | 0.70 | 0 |
| Synergy Porous | R3 porous | 1,841 | 11,219.8 | 64 | 0.57 | 0.44 | 0.73 | 12 |
| CLS | Weill ring | 106 | 1,757.3 | 10 | 0.57 | 0.25 | 1.01 | 0 |
| Exeter V40 | Delta-TT Cup | 286 | 1,236.4 | 7 | 0.57 | 0.23 | 1.17 | 28 |
| Exeter V40 | Tritanium | 3,713 | 17,285.8 | 97 | 0.56 | 0.46 | 0.68 | 282 |
| CCA SS | CCB | 778 | 6,615.4 | 37 | 0.56 | 0.39 | 0.76 | 1 |
| Lateral straight stem | Muller PE cup | 753 | 7,526.4 | 42 | 0.56 | 0.40 | 0.75 | 1 |
| TwinSys uncemented | Trilogy | 209 | 2,152.5 | 12 | 0.56 | 0.27 | 0.94 | 0 |
| Elite plus | Elite Plus LPW | 282 | 3,235.8 | 18 | 0.56 | 0.33 | 0.88 | 0 |
| Tri-Lock BPS | Pinnacle | 93 | 545.9 | 3 | 0.55 | 0.11 | 1.61 | 29 |
| Exeter | Bio-clad poly | 113 | 1,276.0 | 7 | 0.55 | 0.22 | 1.13 | 0 |
| Elite plus | Elite Plus Ogee | 110 | 1,124.4 | 6 | 0.53 | 0.20 | 1.16 | 0 |
| M/L Taper | Trident | 333 | 1,327.6 | 7 | 0.53 | 0.21 | 1.09 | 29 |
| Exeter | Muller PE cup | 119 | 1,532.3 | 8 | 0.52 | 0.23 | 1.03 | 0 |
| CCA SS | RM Pressfit cup | 135 | 1,366.4 | 7 | 0.51 | 0.21 | 1.06 | 0 |
| Avenir Muller uncemented | RM cup | 105 | 993.6 | 5 | 0.50 | 0.14 | 1.10 | 0 |
| Lateral straight stem | Continuum TM | 78 | 596.4 | 3 | 0.50 | 0.07 | 1.34 | 0 |
| Stemsys | Delta-PF Cup | 548 | 1,989.9 | 10 | 0.50 | 0.22 | 0.89 | 84 |
| H-Max M | Delta-TT Cup | 86 | 798.4 | 4 | 0.50 | 0.14 | 1.28 | 0 |
| CLS | Fitmore | 2,379 | 27,549.5 | 137 | 0.50 | 0.42 | 0.59 | 40 |
| Stemsys | Fixa Ti Por | 879 | 4,245.4 | 21 | 0.49 | 0.31 | 0.76 | 43 |
| CLS | Morscher | 1,682 | 25,357.7 | 125 | 0.49 | 0.41 | 0.59 | 0 |
| Exeter V40 | Contemporary | 6,628 | 56,483.6 | 273 | 0.48 | 0.43 | 0.54 | 42 |
| Spectron | Fitmore | 78 | 1,038.8 | 5 | 0.48 | 0.13 | 1.06 | 0 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|--------------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|-----------------|
| CPCS | R3 porous | 367 | 1,471.7 | 7 | 0.48 | 0.17 | 0.93 | 2 |
| SL monoblock | Muller PE cup | 488 | 5,681.6 | 27 | 0.48 | 0.31 | 0.68 | 0 |
| TwinSys uncemented | Continuum TM | 137 | 1,060.9 | 5 | 0.47 | 0.15 | 1.10 | 2 |
| Exeter V40 | Polymax | 84 | 214.0 | 1 | 0.47 | 0.01 | 2.60 | 5 |
| Exeter V40 | Pinnacle | 3,161 | 16,467.6 | 76 | 0.46 | 0.36 | 0.58 | 348 |
| TwinSys cemented | RM Pressfit cup | 2,193 | 11,837.2 | 54 | 0.46 | 0.34 | 0.59 | 147 |
| Exeter | Morscher | 551 | 8,835.7 | 40 | 0.45 | 0.32 | 0.61 | 0 |
| Spectron | Biomex acet shell porous | 68 | 1,106.2 | 5 | 0.45 | 0.15 | 1.05 | 0 |
| Corail | Trident | 104 | 667.0 | 3 | 0.45 | 0.09 | 1.31 | 5 |
| M/L Taper | Trilogy | 215 | 2,224.5 | 10 | 0.45 | 0.22 | 0.83 | 0 |
| Exeter V40 | Morscher | 630 | 8,024.4 | 36 | 0.45 | 0.31 | 0.62 | 0 |
| Versys | Trilogy | 272 | 4,256.2 | 19 | 0.45 | 0.27 | 0.70 | 0 |
| Exeter | Trilogy | 213 | 3,155.4 | 14 | 0.44 | 0.24 | 0.74 | 0 |
| Charnley | Charnley | 456 | 5,647.1 | 25 | 0.44 | 0.29 | 0.65 | 0 |
| Exeter V40 | Trident | 12,521 | 82,734.5 | 365 | 0.44 | 0.40 | 0.49 | 1093 |
| Summit | Trilogy | 186 | 1,587.2 | 7 | 0.44 | 0.18 | 0.91 | 8 |
| Summit | Duraloc | 101 | 1,368.6 | 6 | 0.44 | 0.16 | 0.95 | 0 |
| Exeter V40 | Osteolock | 270 | 3,456.1 | 15 | 0.43 | 0.23 | 0.70 | 0 |
| Exeter V40 | Exeter X3 | 2,751 | 11,572.1 | 50 | 0.43 | 0.32 | 0.57 | 295 |
| Wagner cone stem | Fitmore | 78 | 936.7 | 4 | 0.43 | 0.12 | 1.09 | 2 |
| Corail | G7 acetabular | 70 | 236.7 | 1 | 0.42 | 0.01 | 2.35 | 23 |
| Exeter V40 | CCB | 586 | 3,790.6 | 16 | 0.42 | 0.23 | 0.67 | 9 |
| Accolade | Trident | 1,867 | 23,444.4 | 98 | 0.42 | 0.34 | 0.51 | 0 |
| Exeter V40 | Reflection cemented | 988 | 6,870.8 | 28 | 0.41 | 0.26 | 0.58 | 28 |
| Spectron | Mallory-Head | 152 | 1,972.8 | 8 | 0.41 | 0.18 | 0.80 | 0 |
| Avenir Muller uncemented | RM Pressfit cup | 53 | 253.8 | 1 | 0.39 | 0.01 | 2.20 | 0 |
| Stemsys | RM Pressfit cup | 375 | 1,795.7 | 7 | 0.39 | 0.16 | 0.80 | 20 |
| Accolade II | Delta-TT Cup | 73 | 258.8 | 1 | 0.39 | 0.01 | 2.15 | 0 |
| Spectron | R3 porous | 448 | 3,136.4 | 12 | 0.38 | 0.19 | 0.65 | 7 |
| Corail | Reflection porous | 140 | 1,569.9 | 6 | 0.38 | 0.14 | 0.83 | 0 |
| CLS | Pinnacle | 105 | 785.9 | 3 | 0.38 | 0.08 | 1.12 | 6 |
| Standard straight stem | Muller PE cup | 632 | 6,129.6 | 23 | 0.38 | 0.24 | 0.56 | 0 |
| Exeter V40 | Trilogy | 3,090 | 24,160.1 | 89 | 0.37 | 0.30 | 0.45 | 145 |
| Lateral straight stem | Weber | 287 | 3,045.7 | 11 | 0.36 | 0.18 | 0.65 | 0 |
| TwinSys cemented | RM cup | 148 | 1,663.2 | 6 | 0.36 | 0.11 | 0.74 | 0 |
| Exeter V40 | RM Pressfit cup | 2,935 | 15,476.1 | 55 | 0.36 | 0.27 | 0.46 | 287 |
| C-Stem | Elite Plus Ogee | 55 | 569.5 | 2 | 0.35 | 0.04 | 1.27 | 0 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|--------------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|-----------------|
| Corail | Tritanium | 175 | 1,143.7 | 4 | 0.35 | 0.10 | 0.90 | 1 |
| Synergy Porous | Reflection porous | 1,239 | 13,964.3 | 48 | 0.34 | 0.25 | 0.46 | 1 |
| CPT | Pinnacle | 66 | 596.9 | 2 | 0.34 | 0.04 | 1.21 | 1 |
| MS 30 | Continuum TM | 466 | 2,388.2 | 8 | 0.33 | 0.14 | 0.66 | 29 |
| MS 30 | Muller PE cup | 462 | 4,593.9 | 15 | 0.33 | 0.18 | 0.54 | 0 |
| Exeter V40 | Reflection porous | 476 | 4,728.2 | 15 | 0.32 | 0.17 | 0.51 | 0 |
| Corail | Ultima | 135 | 1,267.6 | 4 | 0.32 | 0.09 | 0.81 | 0 |
| Trabecular Metal Stem | Monoblock Acetabular Cup | 74 | 958.6 | 3 | 0.31 | 0.04 | 0.84 | 0 |
| Exeter V40 | Muller PE cup | 94 | 974.5 | 3 | 0.31 | 0.06 | 0.90 | 0 |
| Avenir Muller uncemented | Pinnacle | 99 | 981.2 | 3 | 0.31 | 0.04 | 0.82 | 0 |
| Corail | Trilogy | 218 | 1,322.7 | 4 | 0.30 | 0.08 | 0.77 | 2 |
| MS 30 | Fitmore | 2,550 | 17,973.4 | 53 | 0.29 | 0.22 | 0.39 | 193 |
| Standard straight stem | Weber | 134 | 1,364.3 | 4 | 0.29 | 0.08 | 0.75 | 0 |
| Corail | Delta-PF Cup | 82 | 1,026.1 | 3 | 0.29 | 0.06 | 0.85 | 1 |
| Exeter V40 | Monoblock Acetabular Cup | 123 | 1,743.7 | 5 | 0.29 | 0.09 | 0.67 | 0 |
| Versys cemented | Trilogy | 238 | 2,820.6 | 8 | 0.28 | 0.12 | 0.56 | 0 |
| Standard straight stem | ZCA all-poly cup | 50 | 362.7 | 1 | 0.28 | 0.00 | 1.54 | 0 |
| SL modular stem | Muller PE cup | 83 | 1,144.6 | 3 | 0.26 | 0.05 | 0.77 | 0 |
| Avenir Muller uncemented | Tritanium | 91 | 796.6 | 2 | 0.25 | 0.03 | 0.91 | 0 |
| Friendly | Delta-PF Cup | 172 | 2,003.8 | 5 | 0.25 | 0.08 | 0.58 | 3 |
| MS 30 | Trilogy | 383 | 2,519.9 | 6 | 0.24 | 0.08 | 0.49 | 23 |
| Echo Bi-Metric | Exceed ABT Ringloc-X | 57 | 421.3 | 1 | 0.24 | 0.01 | 1.32 | 0 |
| Stemsys | DeltaMotion Cup | 541 | 3,430.1 | 8 | 0.23 | 0.10 | 0.46 | 15 |
| Accolade | Tritanium | 152 | 1,331.0 | 3 | 0.23 | 0.05 | 0.66 | 0 |
| Synergy Porous | Delta-PF Cup | 96 | 955.8 | 2 | 0.21 | 0.03 | 0.76 | 0 |
| Lateral straight stem | RM Pressfit cup | 173 | 1,468.1 | 3 | 0.20 | 0.04 | 0.60 | 0 |
| Basis | Reflection porous | 108 | 984.9 | 2 | 0.20 | 0.02 | 0.73 | 0 |
| Exeter V40 | CLS Expansion | 88 | 1,077.8 | 2 | 0.19 | 0.02 | 0.67 | 0 |
| CPT | ZCA all-poly cup | 98 | 601.5 | 1 | 0.17 | 0.00 | 0.93 | 0 |
| Exeter V40 | Weber | 53 | 606.3 | 1 | 0.16 | 0.00 | 0.92 | 0 |
| Accolade | Pinnacle | 180 | 1,887.6 | 3 | 0.16 | 0.03 | 0.46 | 0 |
| MS 30 | ZCA all-poly cup | 94 | 640.1 | 1 | 0.16 | 0.00 | 0.87 | 0 |
| Exeter V40 | Fitmore | 1,121 | 6,678.0 | 10 | 0.15 | 0.07 | 0.27 | 54 |
| Exeter V40 | ZCA | 102 | 669.3 | 1 | 0.15 | 0.00 | 0.83 | 4 |

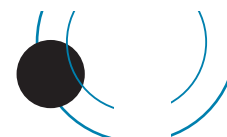


| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. Yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | | Procedures 2020 |
|------------------------|-----------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|-----------------|
| Corail | DeltaMotion Cup | 78 | 672.2 | 1 | 0.15 | 0.00 | 0.83 | 0 |
| Lateral straight stem | ZCA | 98 | 853.1 | 1 | 0.12 | 0.00 | 0.65 | 0 |
| TwinSys uncemented | Delta-PF Cup | 379 | 3,699.7 | 4 | 0.11 | 0.02 | 0.26 | 9 |
| Standard straight stem | RM Pressfit cup | 137 | 1,234.6 | 1 | 0.08 | 0.00 | 0.45 | 0 |
| Exeter | Trident | 84 | 1,388.2 | 1 | 0.07 | 0.00 | 0.40 | 0 |
| C-Stem | Marathon cemented | 94 | 465.8 | 0 | 0.00 | 0.00 | 0.79 | 0 |
| Exeter V40 | ZCA all-poly cup | 110 | 555.2 | 0 | 0.00 | 0.00 | 0.66 | 1 |
| Lateral straight stem | ZCA all-poly cup | 70 | 528.9 | 0 | 0.00 | 0.00 | 0.70 | 0 |
| MS 30 | Pinnacle | 105 | 233.6 | 0 | 0.00 | 0.00 | 1.58 | 39 |
| Stemsys cemented | Delta-PF Cup | 79 | 272.6 | 0 | 0.00 | 0.00 | 1.35 | 15 |
| Stemsys cemented | RM Pressfit cup | 82 | 272.5 | 0 | 0.00 | 0.00 | 1.35 | 5 |
| Synergy Porous | Continuum TM | 55 | 230.6 | 0 | 0.00 | 0.00 | 1.60 | 0 |
| Taperloc Complete | Delta-TT Cup | 109 | 197.3 | 0 | 0.00 | 0.00 | 1.87 | 32 |
| TwinSys cemented | Reflection porous | 59 | 285.9 | 0 | 0.00 | 0.00 | 1.29 | 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 | 6,627 | 56,483.5 | 273 | 0.48 | 0.43 | 0.54 |
| Spectron | Reflection cemented | 2,958 | 31,048.2 | 372 | 1.20 | 1.08 | 1.33 |
| Exeter V40 | Exeter X3 | 2,751 | 11,572.1 | 50 | 0.43 | 0.32 | 0.57 |
| Exeter V40 | Exeter | 1,639 | 16,722.0 | 96 | 0.57 | 0.47 | 0.70 |
| Exeter | Contemporary | 1,551 | 18,983.3 | 191 | 1.01 | 0.87 | 1.16 |
| Exeter | Exeter | 1,326 | 15,902.9 | 119 | 0.75 | 0.62 | 0.89 |
| Exeter V40 | Reflection cemented | 988 | 6,870.8 | 28 | 0.41 | 0.26 | 0.58 |
| CCA SS | CCB | 778 | 6,615.4 | 37 | 0.56 | 0.39 | 0.76 |
| Lateral straight stem | Muller PE cup | 753 | 7,526.4 | 42 | 0.56 | 0.40 | 0.75 |
| Standard straight stem | Muller PE cup | 632 | 6,129.6 | 23 | 0.38 | 0.24 | 0.56 |
| Exeter V40 | CCB | 586 | 3,790.6 | 16 | 0.42 | 0.23 | 0.67 |
| CPT | ZCA | 550 | 5,863.0 | 38 | 0.65 | 0.45 | 0.88 |
| SL monoblock | Muller PE cup | 488 | 5,681.6 | 27 | 0.48 | 0.31 | 0.68 |
| MS 30 | Muller PE cup | 462 | 4,593.9 | 15 | 0.33 | 0.18 | 0.54 |
| Charnley | Charnley | 456 | 5,647.1 | 25 | 0.44 | 0.29 | 0.65 |
| TwinSys cemented | CCB | 454 | 2,793.5 | 22 | 0.79 | 0.49 | 1.19 |
| Versys cemented | ZCA | 391 | 4,464.2 | 32 | 0.72 | 0.49 | 1.01 |
| C-Stem AMT | Marathon cemented | 364 | 2,212.6 | 14 | 0.63 | 0.33 | 1.03 |
| Charnley | Charnley Cup Ogee | 303 | 4,082.2 | 31 | 0.76 | 0.52 | 1.08 |
| Elite plus | Charnley | 298 | 3,837.1 | 25 | 0.65 | 0.42 | 0.96 |
| Lateral straight stem | Weber | 287 | 3,045.7 | 11 | 0.36 | 0.18 | 0.65 |
| Elite plus | Elite Plus LPW | 282 | 3,235.8 | 18 | 0.56 | 0.33 | 0.88 |
| Exeter V40 | Bio-clad poly | 140 | 1,131.2 | 8 | 0.71 | 0.31 | 1.39 |
| Standard straight stem | Weber | 134 | 1,364.3 | 4 | 0.29 | 0.08 | 0.75 |
| MS 30 | Contemporary | 128 | 1,296.2 | 12 | 0.93 | 0.48 | 1.62 |
| Exeter | Muller PE cup | 119 | 1,532.3 | 8 | 0.52 | 0.23 | 1.03 |
| Exeter | Bio-clad poly | 113 | 1,276.0 | 7 | 0.55 | 0.22 | 1.13 |
| Elite plus | Elite Plus Ogee | 110 | 1,124.4 | 6 | 0.53 | 0.20 | 1.16 |
| Exeter V40 | ZCA all-poly cup | 110 | 555.2 | 0 | 0.00 | 0.00 | 0.66 |
| Exeter V40 | ZCA | 102 | 669.3 | 1 | 0.15 | 0.00 | 0.83 |
| CPT | ZCA all-poly cup | 98 | 601.5 | 1 | 0.17 | 0.00 | 0.93 |
| Lateral straight stem | ZCA | 98 | 853.1 | 1 | 0.12 | 0.00 | 0.65 |
| C-Stem | Marathon cemented | 94 | 465.8 | 0 | 0.00 | 0.00 | 0.79 |



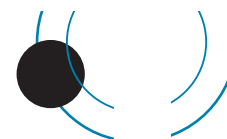
| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 Component-years | Exact 95% confidence interval | |
|------------------------|-----------------------|----------|--------------------|-------------|--------------------------|-------------------------------|------|
| Exeter V40 | Muller PE cup | 94 | 974.5 | 3 | 0.31 | 0.06 | 0.90 |
| MS 30 | ZCA all-poly cup | 94 | 640.1 | 1 | 0.16 | 0.00 | 0.87 |
| SL modular stem | Muller PE cup | 83 | 1144.6 | 3 | 0.26 | 0.05 | 0.77 |
| CCA SS | Contemporary | 74 | 771.1 | 10 | 1.30 | 0.62 | 2.38 |
| Contemporary | Contemporary | 71 | 946.7 | 12 | 1.27 | 0.65 | 2.21 |
| Lateral straight stem | ZCA all-poly cup | 70 | 528.9 | 0 | 0.00 | 0.00 | 0.70 |
| Spectron | Muller PE cup | 66 | 677.3 | 8 | 1.18 | 0.51 | 2.33 |
| C-Stem | Elite Plus Ogee | 55 | 569.5 | 2 | 0.35 | 0.04 | 1.27 |
| Exeter V40 | Weber | 53 | 606.3 | 1 | 0.16 | 0.00 | 0.92 |
| Exeter V40 | PolarCup cemented | 51 | 152.8 | 1 | 0.65 | 0.00 | 3.06 |
| Standard straight stem | ZCA all-poly cup | 50 | 362.7 | 1 | 0.28 | 0.00 | 1.54 |

Uncemented

| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|----------------------|-----------------------|----------|--------------------|-------------|----------|-------------------------------|------|
| Corail | Pinnacle | 13,448 | 69,990.7 | 446 | 0.64 | 0.58 | 0.70 |
| TwinSys uncemented | RM Pressfit cup | 5,190 | 37,126.9 | 237 | 0.64 | 0.56 | 0.72 |
| Summit | Pinnacle | 2,575 | 17,797.4 | 118 | 0.66 | 0.55 | 0.79 |
| CLS | Fitmore | 2,379 | 27,549.5 | 137 | 0.50 | 0.42 | 0.59 |
| Polarstem uncemented | R3 porous | 2,014 | 7,889.0 | 47 | 0.60 | 0.44 | 0.79 |
| Accolade | Trident | 1,867 | 23,444.4 | 98 | 0.42 | 0.34 | 0.51 |
| Synergy Porous | R3 porous | 1,841 | 11,219.8 | 64 | 0.57 | 0.44 | 0.73 |
| CLS | Morscher | 1,682 | 25,357.7 | 125 | 0.49 | 0.41 | 0.59 |
| Accolade II | Trident | 1,325 | 4,215.7 | 27 | 0.64 | 0.42 | 0.93 |
| Accolade II | Tritanium | 1,301 | 4,498.6 | 35 | 0.78 | 0.54 | 1.08 |
| CLS | CLS Expansion | 1,262 | 17,303.9 | 140 | 0.81 | 0.68 | 0.95 |
| Synergy Porous | Reflection porous | 1,239 | 13,964.3 | 48 | 0.34 | 0.25 | 0.46 |
| TwinSys uncemented | Selexys TPS | 1,231 | 12,415.1 | 145 | 1.17 | 0.99 | 1.37 |
| M/L Taper | Continuum TM | 1,047 | 6,087.3 | 42 | 0.69 | 0.49 | 0.92 |
| CLS | Continuum TM | 899 | 4,426.0 | 26 | 0.59 | 0.37 | 0.85 |
| H-Max S | Delta-TT Cup | 898 | 4,435.9 | 37 | 0.83 | 0.59 | 1.15 |
| Stemsys | Fixa Ti Por | 879 | 4,245.4 | 21 | 0.49 | 0.31 | 0.76 |
| Echo Bi-Metric | G7 acetabular | 840 | 1,803.8 | 15 | 0.83 | 0.44 | 1.34 |
| CLS | Duraloc | 699 | 9,896.4 | 114 | 1.15 | 0.95 | 1.38 |
| CLS | Trilogy | 694 | 5,337.5 | 33 | 0.62 | 0.43 | 0.87 |
| CLS | RM Pressfit cup | 627 | 4,868.3 | 34 | 0.70 | 0.48 | 0.96 |
| Stemsys | Delta-PF Cup | 547 | 1,989.8 | 10 | 0.50 | 0.22 | 0.89 |



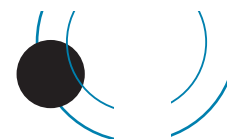
| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|--------------------------|-----------------------|----------|--------------------|-------------|----------|-------------------------------|------|
| Stemsys | Agilis Ti-por | 545 | 2,463.0 | 20 | 0.81 | 0.50 | 1.25 |
| Stemsys | DeltaMotion Cup | 541 | 3,430.1 | 8 | 0.23 | 0.10 | 0.46 |
| Trabecular Metal Stem | Continuum TM | 487 | 3,012.6 | 18 | 0.60 | 0.35 | 0.94 |
| Corail | Duraloc | 464 | 5,730.5 | 54 | 0.94 | 0.71 | 1.23 |
| CBC | RM Pressfit cup | 445 | 3,421.1 | 25 | 0.73 | 0.46 | 1.06 |
| Taperloc Complete | G7 acetabular | 431 | 1,020.3 | 9 | 0.88 | 0.40 | 1.67 |
| S-Rom | Pinnacle | 389 | 4,283.5 | 40 | 0.93 | 0.66 | 1.26 |
| CLS | Reflection porous | 384 | 3,602.6 | 22 | 0.61 | 0.38 | 0.92 |
| TwinSys uncemented | Delta-PF Cup | 379 | 3,699.7 | 4 | 0.11 | 0.02 | 0.26 |
| Stemsys | RM Pressfit cup | 375 | 1,795.7 | 7 | 0.39 | 0.16 | 0.80 |
| ABGII | Trident | 342 | 4,558.3 | 42 | 0.92 | 0.65 | 1.23 |
| Polarstem uncemented | Reflection porous | 335 | 2,605.0 | 16 | 0.61 | 0.35 | 1.00 |
| Corail | Continuum TM | 334 | 1,696.3 | 11 | 0.65 | 0.32 | 1.16 |
| Corail | Fitmore | 333 | 1,475.3 | 13 | 0.88 | 0.47 | 1.51 |
| M/L Taper | Trident | 333 | 1,327.6 | 7 | 0.53 | 0.21 | 1.09 |
| Taperloc Complete | RM Pressfit cup | 326 | 751.7 | 6 | 0.80 | 0.25 | 1.65 |
| Optimys | RM Pressfit cup | 280 | 520.3 | 4 | 0.77 | 0.16 | 1.97 |
| Versys | Trilogy | 272 | 4,256.2 | 19 | 0.45 | 0.27 | 0.70 |
| H-Max S | Delta-PF Cup | 252 | 1,013.7 | 8 | 0.79 | 0.31 | 1.49 |
| Taperloc Complete | Continuum TM | 242 | 445.3 | 6 | 1.35 | 0.43 | 2.78 |
| Corail | Trilogy | 218 | 1,322.7 | 4 | 0.30 | 0.08 | 0.77 |
| M/L Taper | Trilogy | 215 | 2,224.5 | 10 | 0.45 | 0.22 | 0.83 |
| TwinSys uncemented | Trilogy | 209 | 2,152.5 | 12 | 0.56 | 0.27 | 0.94 |
| Quadra-H | Acetabular Shell | 207 | 173.4 | 8 | 4.61 | 1.81 | 8.71 |
| CLS | Durom | 198 | 2,186.5 | 68 | 3.11 | 2.42 | 3.94 |
| CLS | Allofit | 192 | 2,204.9 | 23 | 1.04 | 0.66 | 1.57 |
| Summit | Trilogy | 186 | 1,587.2 | 7 | 0.44 | 0.18 | 0.91 |
| CBC | Expansys shell | 183 | 2,008.4 | 29 | 1.44 | 0.97 | 2.07 |
| Avenir Muller uncemented | Continuum TM | 182 | 1,354.8 | 14 | 1.03 | 0.56 | 1.73 |
| Accolade | Pinnacle | 180 | 1,887.6 | 3 | 0.16 | 0.03 | 0.46 |
| Corail | Tritanium | 175 | 1,143.7 | 4 | 0.35 | 0.10 | 0.90 |
| Stemsys | Polymax | 167 | 526.5 | 4 | 0.76 | 0.21 | 1.95 |
| CLS | Trident | 165 | 2,085.6 | 14 | 0.67 | 0.35 | 1.10 |
| Corail | RM Pressfit cup | 163 | 787.4 | 7 | 0.89 | 0.36 | 1.83 |
| Accolade II | Continuum TM | 157 | 209.2 | 7 | 3.35 | 1.35 | 6.90 |
| Corail | ASR | 156 | 1,326.0 | 84 | 6.33 | 5.05 | 7.84 |
| Accolade | Tritanium | 152 | 1,331.0 | 3 | 0.23 | 0.05 | 0.66 |
| Echo Bi-Metric | Continuum TM | 147 | 417.2 | 4 | 0.96 | 0.26 | 2.45 |
| Corail | Reflection porous | 140 | 1,569.9 | 6 | 0.38 | 0.14 | 0.83 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|--------------------------|--------------------------|----------|--------------------|-------------|----------|-------------------------------|-------|
| ABGII | Duraloc | 139 | 2,087.2 | 43 | 2.06 | 1.49 | 2.78 |
| TwinSys uncemented | Continuum TM | 137 | 1,060.9 | 5 | 0.47 | 0.15 | 1.10 |
| Accolade II | RM Pressfit cup | 134 | 309.8 | 5 | 1.61 | 0.52 | 3.77 |
| Polarstem uncemented | RM Pressfit cup | 133 | 138.4 | 1 | 0.72 | 0.02 | 4.03 |
| S-Rom | ASR | 130 | 867.0 | 96 | 11.07 | 8.92 | 13.46 |
| Omnifit | Trident | 126 | 1,750.6 | 12 | 0.69 | 0.33 | 1.16 |
| TwinSys uncemented | RM cup | 122 | 1,227.4 | 11 | 0.90 | 0.45 | 1.60 |
| MasterSL | Delta-TT Cup | 117 | 233.3 | 3 | 1.29 | 0.27 | 3.76 |
| ABG | Duraloc | 116 | 1,976.9 | 44 | 2.23 | 1.62 | 2.99 |
| Synergy Porous | BHR Acetabular Cup | 114 | 1,160.6 | 42 | 3.62 | 2.61 | 4.89 |
| CLS | RM cup | 113 | 1,318.4 | 18 | 1.37 | 0.81 | 2.16 |
| Prodigy | Duraloc | 113 | 1,561.5 | 25 | 1.60 | 1.04 | 2.36 |
| Taperloc Complete | Delta-TT Cup | 109 | 197.3 | 0 | 0.00 | 0.00 | 1.87 |
| ABGII | Delta-PF Cup | 107 | 1,442.7 | 11 | 0.76 | 0.36 | 1.32 |
| CLS | Weill ring | 106 | 1,757.3 | 10 | 0.57 | 0.25 | 1.01 |
| Avenir Muller uncemented | RM cup | 105 | 993.6 | 5 | 0.50 | 0.14 | 1.10 |
| CLS | Pinnacle | 105 | 785.9 | 3 | 0.38 | 0.08 | 1.12 |
| Mallory-Head | M2A | 105 | 1,389.4 | 17 | 1.22 | 0.69 | 1.91 |
| Corail | Trident | 104 | 667.0 | 3 | 0.45 | 0.09 | 1.31 |
| Summit | Duraloc | 101 | 1,368.6 | 6 | 0.44 | 0.16 | 0.95 |
| Avenir Muller uncemented | Pinnacle | 99 | 981.2 | 3 | 0.31 | 0.04 | 0.82 |
| Synergy Porous | Delta-PF Cup | 96 | 955.8 | 2 | 0.21 | 0.03 | 0.76 |
| Corail | Monoblock Acetabular Cup | 95 | 1,098.8 | 8 | 0.73 | 0.31 | 1.43 |
| Tri-Lock BPS | Pinnacle | 93 | 545.9 | 3 | 0.55 | 0.11 | 1.61 |
| ABGII | RM Pressfit cup | 91 | 384.6 | 8 | 2.08 | 0.90 | 4.10 |
| Anthology Porous | BHR Acetabular Cup | 91 | 790.6 | 50 | 6.32 | 4.64 | 8.27 |
| Avenir Muller uncemented | Tritanium | 91 | 796.6 | 2 | 0.25 | 0.03 | 0.91 |
| Summit | ASR | 88 | 830.1 | 38 | 4.58 | 3.24 | 6.28 |
| Accolade II | Fitmore | 87 | 164.7 | 2 | 1.21 | 0.15 | 4.39 |
| CLS | Tritanium | 87 | 519.0 | 3 | 0.58 | 0.12 | 1.69 |
| H-Max M | Delta-TT Cup | 86 | 798.4 | 4 | 0.50 | 0.14 | 1.28 |
| Corail | Delta-PF Cup | 82 | 1,026.1 | 3 | 0.29 | 0.06 | 0.85 |
| Metafix | Trinity | 82 | 95.8 | 3 | 3.13 | 0.65 | 9.15 |
| CLS | Monoblock Acetabular Cup | 80 | 972.4 | 6 | 0.62 | 0.20 | 1.27 |
| Accolade II | Trident II Tritanium | 79 | 67.9 | 2 | 2.95 | 0.36 | 10.65 |
| Corail | DeltaMotion Cup | 78 | 672.2 | 1 | 0.15 | 0.00 | 0.83 |
| S-Rom | Ultima | 78 | 1,372.8 | 14 | 1.02 | 0.56 | 1.71 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|--------------------------|--------------------------|----------|--------------------|-------------|----------|-------------------------------|-------|
| Wagner cone stem | Fitmore | 78 | 936.7 | 4 | 0.43 | 0.12 | 1.09 |
| AML MMA | Duraloc | 74 | 1,124.1 | 13 | 1.16 | 0.62 | 1.98 |
| Trabecular Metal Stem | Monoblock Acetabular Cup | 74 | 958.6 | 3 | 0.31 | 0.04 | 0.84 |
| Accolade II | Delta-TT Cup | 73 | 258.8 | 1 | 0.39 | 0.01 | 2.15 |
| ABG | ABGII | 72 | 1,171.5 | 16 | 1.37 | 0.78 | 2.22 |
| H-Max M | Delta-PF Cup | 71 | 637.0 | 8 | 1.26 | 0.54 | 2.47 |
| Corail | G7 acetabular | 70 | 236.7 | 1 | 0.42 | 0.01 | 2.35 |
| Avenir Muller uncemented | Fitmore | 69 | 323.8 | 2 | 0.62 | 0.07 | 2.23 |
| Anthology Porous | R3 porous | 68 | 547.1 | 34 | 6.21 | 4.30 | 8.68 |
| ABGII | Pinnacle | 67 | 769.9 | 5 | 0.65 | 0.21 | 1.52 |
| Furlong | Furlong | 66 | 889.6 | 7 | 0.79 | 0.32 | 1.62 |
| M/L Taper | Delta-TT Cup | 64 | 432.0 | 6 | 1.39 | 0.51 | 3.02 |
| CBC | Fitmore | 59 | 703.3 | 5 | 0.71 | 0.23 | 1.66 |
| CLS | Artek | 59 | 762.2 | 26 | 3.41 | 2.18 | 4.92 |
| H-Max S | Trident | 59 | 165.7 | 1 | 0.60 | 0.02 | 3.36 |
| CLS | Trabecular Metal Shell | 57 | 500.8 | 3 | 0.60 | 0.12 | 1.75 |
| Echo Bi-Metric | Exceed ABT Ringloc-X | 57 | 421.3 | 1 | 0.24 | 0.01 | 1.32 |
| Taperloc Complete | Trident | 56 | 23.5 | 1 | 4.25 | 0.11 | 23.66 |
| Synergy Porous | Continuum TM | 55 | 230.6 | 0 | 0.00 | 0.00 | 1.60 |
| Wagner cone stem | Continuum TM | 55 | 237.3 | 2 | 0.84 | 0.10 | 3.04 |
| AML | Duraloc | 53 | 837.9 | 9 | 1.07 | 0.49 | 2.04 |
| Avenir Muller uncemented | RM Pressfit cup | 53 | 253.8 | 1 | 0.39 | 0.01 | 2.20 |

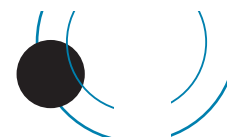


Hybrid

| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|-----------------------|------------------------|----------|--------------------|-------------|----------|-------------------------------|------|
| Exeter V40 | Trident | 12,521 | 82,734.5 | 365 | 0.44 | 0.40 | 0.49 |
| Exeter V40 | Tritanium | 3,713 | 17,285.8 | 97 | 0.56 | 0.46 | 0.68 |
| Exeter V40 | Pinnacle | 3,161 | 16,467.6 | 76 | 0.46 | 0.36 | 0.58 |
| Exeter V40 | Trilogy | 3,090 | 24,160.1 | 89 | 0.37 | 0.30 | 0.45 |
| C-Stem AMT | Pinnacle | 3,036 | 12,633.6 | 97 | 0.77 | 0.62 | 0.93 |
| Exeter V40 | RM Pressfit cup | 2,935 | 15,476.1 | 55 | 0.36 | 0.27 | 0.46 |
| Exeter V40 | Continuum TM | 2,887 | 14,944.8 | 109 | 0.73 | 0.60 | 0.88 |
| Spectron | Reflection porous | 2,755 | 30,457.4 | 261 | 0.86 | 0.75 | 0.97 |
| MS 30 | Fitmore | 2,547 | 17,970.8 | 53 | 0.29 | 0.22 | 0.39 |
| TwinSys cemented | RM Pressfit cup | 2,193 | 11,837.2 | 54 | 0.46 | 0.34 | 0.59 |
| CPT | Continuum TM | 1,729 | 7,742.4 | 57 | 0.74 | 0.55 | 0.95 |
| Spectron | Duraloc | 1,152 | 14,568.4 | 196 | 1.35 | 1.16 | 1.54 |
| Exeter V40 | Fitmore | 1,111 | 6,671.3 | 10 | 0.15 | 0.07 | 0.27 |
| Exeter V40 | Duraloc | 987 | 11,851.2 | 120 | 1.01 | 0.84 | 1.21 |
| CPT | Trilogy | 850 | 7,485.0 | 62 | 0.83 | 0.64 | 1.06 |
| Exeter | Osteolock | 836 | 11,796.1 | 80 | 0.68 | 0.54 | 0.84 |
| MS 30 | Morscher | 787 | 10,520.9 | 66 | 0.63 | 0.48 | 0.79 |
| Exeter V40 | R3 porous | 731 | 3,333.8 | 23 | 0.69 | 0.44 | 1.04 |
| Exeter V40 | Morscher | 630 | 8,024.4 | 36 | 0.45 | 0.31 | 0.62 |
| Elite plus | Duraloc | 608 | 7,574.4 | 122 | 1.61 | 1.34 | 1.92 |
| Exeter | Duraloc | 553 | 8,252.5 | 120 | 1.45 | 1.21 | 1.74 |
| Exeter | Morscher | 551 | 8,835.7 | 40 | 0.45 | 0.32 | 0.61 |
| Lateral straight stem | RM cup | 533 | 5,824.5 | 46 | 0.79 | 0.57 | 1.04 |
| Exeter V40 | Trident II Tritanium | 523 | 436.3 | 4 | 0.92 | 0.25 | 2.35 |
| Exeter V40 | Reflection porous | 476 | 4,728.2 | 15 | 0.32 | 0.17 | 0.51 |
| MS 30 | Continuum TM | 466 | 2,388.2 | 8 | 0.33 | 0.14 | 0.66 |
| Spectron | R3 porous | 448 | 3,136.4 | 12 | 0.38 | 0.19 | 0.65 |
| MS 30 | Trilogy | 383 | 2,519.9 | 6 | 0.24 | 0.08 | 0.49 |
| CPCS | R3 porous | 367 | 1,471.7 | 7 | 0.48 | 0.17 | 0.93 |
| SL modular stem | RM cup | 322 | 4,878.7 | 42 | 0.86 | 0.62 | 1.16 |
| Exeter V40 | G7 acetabular | 310 | 591.1 | 5 | 0.85 | 0.27 | 1.97 |
| Exeter V40 | Delta-TT Cup | 286 | 1,236.4 | 7 | 0.57 | 0.23 | 1.17 |
| Exeter V40 | Osteolock | 270 | 3,456.1 | 15 | 0.43 | 0.23 | 0.70 |
| Exeter V40 | Trabecular Metal Shell | 241 | 1,367.4 | 15 | 1.10 | 0.59 | 1.76 |
| Versys cemented | Trilogy | 238 | 2,820.6 | 8 | 0.28 | 0.12 | 0.56 |
| Exeter | Trilogy | 213 | 3,155.4 | 14 | 0.44 | 0.24 | 0.74 |
| CPT | Duraloc | 212 | 2,612.6 | 18 | 0.69 | 0.41 | 1.09 |
| Spectron | Morscher | 210 | 2,953.0 | 33 | 1.12 | 0.76 | 1.55 |
| CPT | Fitmore | 195 | 1,358.6 | 12 | 0.88 | 0.46 | 1.54 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|------------------------|--------------------------|----------|--------------------|-------------|----------|-------------------------------|-------|
| Lateral straight stem | RM Pressfit cup | 173 | 1,468.1 | 3 | 0.20 | 0.04 | 0.60 |
| Friendly | Delta-PF Cup | 172 | 2,003.8 | 5 | 0.25 | 0.08 | 0.58 |
| Spectron | Mallory-Head | 152 | 1,972.8 | 8 | 0.41 | 0.18 | 0.80 |
| Quadra-C | Acetabular Shell | 148 | 142.0 | 2 | 1.41 | 0.17 | 5.09 |
| TwinSys cemented | RM cup | 148 | 1,663.2 | 6 | 0.36 | 0.11 | 0.74 |
| CPT | Trident | 145 | 1,842.7 | 12 | 0.65 | 0.34 | 1.14 |
| TwinSys cemented | Continuum TM | 142 | 629.8 | 4 | 0.64 | 0.17 | 1.63 |
| Standard straight stem | RM cup | 138 | 1,681.5 | 13 | 0.77 | 0.41 | 1.32 |
| Standard straight stem | RM Pressfit cup stem | 137 | 1,234.6 | 1 | 0.08 | 0.00 | 0.45 |
| CCA SS | RM Pressfit cup | 135 | 1,366.4 | 7 | 0.51 | 0.21 | 1.06 |
| Corail | Ultima | 134 | 1,258.4 | 4 | 0.32 | 0.09 | 0.81 |
| C-Stem AMT | RM Pressfit cup | 131 | 683.5 | 5 | 0.73 | 0.24 | 1.71 |
| Exeter | CLS Expansion | 129 | 1,654.5 | 10 | 0.60 | 0.29 | 1.11 |
| Exeter V40 | Monoblock Acetabular Cup | 123 | 1,743.7 | 5 | 0.29 | 0.09 | 0.67 |
| TwinSys cemented | Pinnacle | 119 | 454.6 | 10 | 2.20 | 0.98 | 3.90 |
| CPT | Delta-TT Cup | 117 | 366.0 | 3 | 0.82 | 0.17 | 2.40 |
| Accolade | Muller PE cup | 114 | 1,296.9 | 10 | 0.77 | 0.34 | 1.37 |
| H-Max C | Delta-TT Cup | 110 | 280.8 | 5 | 1.78 | 0.58 | 4.16 |
| Basis | Reflection porous | 108 | 984.9 | 2 | 0.20 | 0.02 | 0.73 |
| CPT | G7 acetabular | 108 | 239.9 | 7 | 2.92 | 1.17 | 6.01 |
| MS 30 | Pinnacle | 105 | 233.6 | 0 | 0.00 | 0.00 | 1.58 |
| MS 30 | G7 acetabular | 92 | 59.7 | 2 | 3.35 | 0.41 | 12.10 |
| MS 30 | RM Pressfit cup | 90 | 868.8 | 5 | 0.58 | 0.16 | 1.26 |
| Exeter V40 | CLS Expansion | 88 | 1,077.8 | 2 | 0.19 | 0.02 | 0.67 |
| C-Stem | Pinnacle | 85 | 399.4 | 4 | 1.00 | 0.27 | 2.56 |
| CPT | Titanium | 85 | 759.6 | 7 | 0.92 | 0.37 | 1.90 |
| CPT | Monoblock Acetabular Cup | 84 | 1,051.4 | 8 | 0.76 | 0.30 | 1.44 |
| Exeter | Trident | 84 | 1,388.2 | 1 | 0.07 | 0.00 | 0.40 |
| Exeter V40 | Polymax | 83 | 213.9 | 0 | 0.00 | 0.00 | 1.72 |
| Stemsys cemented | RM Pressfit cup | 82 | 272.5 | 0 | 0.00 | 0.00 | 1.35 |
| Stemsys cemented | Delta-PF Cup | 79 | 272.6 | 0 | 0.00 | 0.00 | 1.35 |
| Lateral straight stem | Continuum TM | 78 | 596.4 | 3 | 0.50 | 0.07 | 1.34 |
| Spectron | Fitmore | 78 | 1,038.8 | 5 | 0.48 | 0.13 | 1.06 |
| Spectron | Trident | 78 | 968.8 | 6 | 0.62 | 0.20 | 1.28 |
| Lateral straight stem | Trilogy | 69 | 625.5 | 13 | 2.08 | 1.11 | 3.55 |
| Friendly | Delta-TT Cup | 68 | 521.2 | 5 | 0.96 | 0.31 | 2.24 |
| Spectron | Biomex acet shell porous | 68 | 1,106.2 | 5 | 0.45 | 0.15 | 1.05 |
| CPT | Pinnacle | 66 | 596.9 | 2 | 0.34 | 0.04 | 1.21 |



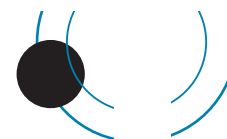
| Femur Prosthesis | Acetabular Prosthesis | No. Ops. | Observed comp. yrs | No. revised | Rate/100 | Exact 95% confidence interval | |
|------------------|-----------------------|----------|--------------------|-------------|----------|-------------------------------|------|
| TwinSys cemented | Selexys TPS | 65 | 549.4 | 6 | 1.09 | 0.40 | 2.38 |
| TwinSys cemented | Reflection porous | 59 | 285.9 | 0 | 0.00 | 0.00 | 1.29 |
| MS 30 | Duraloc | 55 | 824.9 | 7 | 0.85 | 0.30 | 1.67 |
| C-Stem | Duraloc | 53 | 679.4 | 6 | 0.88 | 0.32 | 1.92 |

Prosthesis combinations based on femur in alphabetical order

| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|-----------------------|---------|---------------|----------------|--------------------------|-------------------------------|-------|-----------------|
| ABG | Duraloc | 116 | 1,976.9 | 44 | 2.23 | 1.62 | 2.99 | 0 |
| ABG | ABGII | 72 | 1,171.5 | 16 | 1.37 | 0.78 | 2.22 | 0 |
| ABGII | RM Pressfit cup | 91 | 384.6 | 8 | 2.08 | 0.90 | 4.10 | 0 |
| ABGII | Duraloc | 139 | 2,087.2 | 43 | 2.06 | 1.49 | 2.78 | 0 |
| ABGII | Trident | 342 | 4,558.3 | 42 | 0.92 | 0.65 | 1.23 | 0 |
| ABGII | Delta-PF Cup | 107 | 1,442.7 | 11 | 0.76 | 0.36 | 1.32 | 0 |
| ABGII | Pinnacle | 67 | 769.9 | 5 | 0.65 | 0.21 | 1.52 | 0 |
| Accolade | Muller PE cup | 114 | 1,296.9 | 10 | 0.77 | 0.34 | 1.37 | 0 |
| Accolade | Trident | 1,867 | 23,444.4 | 98 | 0.42 | 0.34 | 0.51 | 0 |
| Accolade | Tritanium | 152 | 1,331.0 | 3 | 0.23 | 0.05 | 0.66 | 0 |
| Accolade | Pinnacle | 180 | 1,887.6 | 3 | 0.16 | 0.03 | 0.46 | 0 |
| Accolade II | Continuum TM | 159 | 210.2 | 7 | 3.33 | 1.34 | 6.86 | 56 |
| Accolade II | Trident II Tritanium | 80 | 68.0 | 2 | 2.94 | 0.36 | 10.62 | 52 |
| Accolade II | RM Pressfit cup | 134 | 309.8 | 5 | 1.61 | 0.52 | 3.77 | 39 |
| Accolade II | Fitmore | 87 | 164.7 | 2 | 1.21 | 0.15 | 4.39 | 23 |
| Accolade II | Tritanium | 1,301 | 4,498.6 | 35 | 0.78 | 0.54 | 1.08 | 175 |
| Accolade II | Trident | 1,331 | 4,219.4 | 27 | 0.64 | 0.42 | 0.93 | 265 |
| Accolade II | Delta-TT Cup | 73 | 258.8 | 1 | 0.39 | 0.01 | 2.15 | 0 |
| AML | Duraloc | 53 | 837.9 | 9 | 1.07 | 0.49 | 2.04 | 0 |
| AML MMA | Duraloc | 74 | 1,124.1 | 13 | 1.16 | 0.62 | 1.98 | 0 |
| Anthology Porous | BHR Acetabular Cup | 93 | 805.0 | 51 | 6.34 | 4.72 | 8.33 | 0 |
| Anthology Porous | R3 porous | 68 | 547.1 | 34 | 6.21 | 4.30 | 8.68 | 0 |
| Avenir Muller uncemented | Continuum TM | 182 | 1,354.8 | 14 | 1.03 | 0.56 | 1.73 | 0 |
| Avenir Muller uncemented | Fitmore | 69 | 323.8 | 2 | 0.62 | 0.07 | 2.23 | 1 |
| Avenir Muller uncemented | RM cup | 105 | 993.6 | 5 | 0.50 | 0.14 | 1.10 | 0 |
| Avenir Muller uncemented | RM Pressfit cup | 53 | 253.8 | 1 | 0.39 | 0.01 | 2.20 | 0 |
| Avenir Muller uncemented | Pinnacle | 99 | 981.2 | 3 | 0.31 | 0.04 | 0.82 | 0 |



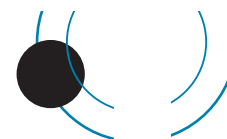
| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|--------------------------|--------------------------|---------|---------------|----------------|--------------------------|-------------------------------|------|-----------------|
| Avenir Muller uncemented | Tritanium | 91 | 796.6 | 2 | 0.25 | 0.03 | 0.91 | 0 |
| Basis | Reflection porous | 108 | 984.9 | 2 | 0.20 | 0.02 | 0.73 | 0 |
| CBC | Expansys shell | 183 | 2,008.4 | 29 | 1.44 | 0.97 | 2.07 | 0 |
| CBC | RM Pressfit cup | 445 | 3,421.1 | 25 | 0.73 | 0.46 | 1.06 | 0 |
| CBC | Fitmore | 59 | 703.3 | 5 | 0.71 | 0.23 | 1.66 | 0 |
| CCA SS | Contemporary | 74 | 771.1 | 10 | 1.30 | 0.62 | 2.38 | 0 |
| CCA SS | CCB | 778 | 6,615.4 | 37 | 0.56 | 0.39 | 0.76 | 1 |
| CCA SS | RM Pressfit cup | 135 | 1,366.4 | 7 | 0.51 | 0.21 | 1.06 | 0 |
| Charnley | Charnley Cup Ogee | 303 | 4,082.2 | 31 | 0.76 | 0.52 | 1.08 | 0 |
| Charnley | Charnley | 456 | 5,647.1 | 25 | 0.44 | 0.29 | 0.65 | 0 |
| CLS | Artek | 59 | 762.2 | 26 | 3.41 | 2.18 | 4.92 | 0 |
| CLS | Durom | 198 | 2,186.5 | 68 | 3.11 | 2.42 | 3.94 | 0 |
| CLS | RM cup | 113 | 1,318.4 | 18 | 1.37 | 0.81 | 2.16 | 0 |
| CLS | Duraloc | 699 | 9,896.4 | 114 | 1.15 | 0.95 | 1.38 | 0 |
| CLS | Allofit | 192 | 2,204.9 | 23 | 1.04 | 0.66 | 1.57 | 0 |
| CLS | CLS Expansion | 1,262 | 17,303.9 | 140 | 0.81 | 0.68 | 0.95 | 0 |
| CLS | RM Pressfit cup | 627 | 4,868.3 | 34 | 0.70 | 0.48 | 0.96 | 35 |
| CLS | Trident | 165 | 2,085.6 | 14 | 0.67 | 0.35 | 1.10 | 0 |
| CLS | Trilogy | 694 | 5,337.5 | 33 | 0.62 | 0.43 | 0.87 | 40 |
| CLS | Monoblock Acetabular Cup | 80 | 972.4 | 6 | 0.62 | 0.20 | 1.27 | 0 |
| CLS | Reflection porous | 384 | 3,602.6 | 22 | 0.61 | 0.38 | 0.92 | 2 |
| CLS | Trabecular Metal Shell | 57 | 500.8 | 3 | 0.60 | 0.12 | 1.75 | 3 |
| CLS | Continuum TM | 899 | 4,426.0 | 26 | 0.59 | 0.37 | 0.85 | 103 |
| CLS | Tritanium | 87 | 519.0 | 3 | 0.58 | 0.12 | 1.69 | 5 |
| CLS | Weill ring | 106 | 1,757.3 | 10 | 0.57 | 0.25 | 1.01 | 0 |
| CLS | Fitmore | 2,379 | 27,549.5 | 137 | 0.50 | 0.42 | 0.59 | 40 |
| CLS | Morscher | 1,682 | 25,357.7 | 125 | 0.49 | 0.41 | 0.59 | 0 |
| CLS | Pinnacle | 105 | 785.9 | 3 | 0.38 | 0.08 | 1.12 | 6 |
| Contemporary | Contemporary | 71 | 946.7 | 12 | 1.27 | 0.65 | 2.21 | 0 |
| Corail | ASR | 156 | 1,326.0 | 84 | 6.33 | 5.05 | 7.84 | 0 |
| Corail | Duraloc | 464 | 5,730.5 | 54 | 0.94 | 0.71 | 1.23 | 0 |
| Corail | RM Pressfit cup | 163 | 787.4 | 7 | 0.89 | 0.36 | 1.83 | 10 |
| Corail | Fitmore | 333 | 1,475.3 | 13 | 0.88 | 0.47 | 1.51 | 26 |
| Corail | Monoblock Acetabular Cup | 95 | 1,098.8 | 8 | 0.73 | 0.31 | 1.43 | 0 |
| Corail | Continuum TM | 334 | 1,696.3 | 11 | 0.65 | 0.32 | 1.16 | 8 |
| Corail | Pinnacle | 13,448 | 69,990.7 | 446 | 0.64 | 0.58 | 0.70 | 1528 |
| Corail | Trident | 104 | 667.0 | 3 | 0.45 | 0.09 | 1.31 | 5 |
| Corail | G7 acetabular | 70 | 236.7 | 1 | 0.42 | 0.01 | 2.35 | 23 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|------------------|--------------------------|---------|---------------|----------------|--------------------------|-------------------------------|------|-----------------|
| Corail | Reflection porous | 140 | 1,569.9 | 6 | 0.38 | 0.14 | 0.83 | 0 |
| Corail | Tritanium | 175 | 1,143.7 | 4 | 0.35 | 0.10 | 0.90 | 1 |
| Corail | Ultima | 135 | 1,267.6 | 4 | 0.32 | 0.09 | 0.81 | 0 |
| Corail | Trilogy | 218 | 1,322.7 | 4 | 0.30 | 0.08 | 0.77 | 2 |
| Corail | Delta-PF Cup | 82 | 1,026.1 | 3 | 0.29 | 0.06 | 0.85 | 1 |
| Corail | DeltaMotion Cup | 78 | 672.2 | 1 | 0.15 | 0.00 | 0.83 | 0 |
| CPCS | R3 porous | 367 | 1,471.7 | 7 | 0.48 | 0.17 | 0.93 | 2 |
| CPT | G7 acetabular | 109 | 240.8 | 7 | 2.91 | 1.04 | 5.71 | 26 |
| CPT | Tritanium | 85 | 759.6 | 7 | 0.92 | 0.37 | 1.90 | 0 |
| CPT | Fitmore | 195 | 1,358.6 | 12 | 0.88 | 0.46 | 1.54 | 0 |
| CPT | Trilogy | 850 | 7,485.0 | 62 | 0.83 | 0.64 | 1.06 | 0 |
| CPT | Delta-TT Cup | 117 | 366.0 | 3 | 0.82 | 0.17 | 2.40 | 14 |
| CPT | Monoblock Acetabular Cup | 84 | 1,051.4 | 8 | 0.76 | 0.30 | 1.44 | 0 |
| CPT | Continuum TM | 1,729 | 7,742.4 | 57 | 0.74 | 0.55 | 0.95 | 177 |
| CPT | Duraloc | 212 | 2,612.6 | 18 | 0.69 | 0.41 | 1.09 | 0 |
| CPT | Trident | 145 | 1,842.7 | 12 | 0.65 | 0.34 | 1.14 | 0 |
| CPT | ZCA | 550 | 5,863.0 | 38 | 0.65 | 0.45 | 0.88 | 0 |
| CPT | Pinnacle | 66 | 596.9 | 2 | 0.34 | 0.04 | 1.21 | 1 |
| CPT | ZCA all-poly cup | 98 | 601.5 | 1 | 0.17 | 0.00 | 0.93 | 0 |
| C-Stem | Pinnacle | 85 | 399.4 | 4 | 1.00 | 0.27 | 2.56 | 0 |
| C-Stem | Duraloc | 53 | 679.4 | 6 | 0.88 | 0.32 | 1.92 | 0 |
| C-Stem | Elite Plus Ogee | 55 | 569.5 | 2 | 0.35 | 0.04 | 1.27 | 0 |
| C-Stem | Marathon cemented | 94 | 465.8 | 0 | 0.00 | 0.00 | 0.79 | 0 |
| C-Stem AMT | Pinnacle | 3,036 | 12,633.6 | 97 | 0.77 | 0.62 | 0.93 | 344 |
| C-Stem AMT | RM Pressfit cup | 131 | 683.5 | 5 | 0.73 | 0.24 | 1.71 | 1 |
| C-Stem AMT | Marathon cemented | 365 | 2,213.0 | 14 | 0.63 | 0.33 | 1.03 | 10 |
| Echo Bi-Metric | Continuum TM | 147 | 417.2 | 4 | 0.96 | 0.26 | 2.45 | 24 |
| Echo Bi-Metric | G7 acetabular | 840 | 1,803.8 | 15 | 0.83 | 0.44 | 1.34 | 298 |
| Echo Bi-Metric | Exceed ABT Ringloc-X | 57 | 421.3 | 1 | 0.24 | 0.01 | 1.32 | 0 |
| Elite plus | Duraloc | 608 | 7,574.4 | 122 | 1.61 | 1.34 | 1.92 | 0 |
| Elite plus | Charnley | 298 | 3,837.1 | 25 | 0.65 | 0.42 | 0.96 | 0 |
| Elite plus | Elite Plus LPW | 282 | 3,235.8 | 18 | 0.56 | 0.33 | 0.88 | 0 |
| Elite plus | Elite Plus Ogee | 110 | 1,124.4 | 6 | 0.53 | 0.20 | 1.16 | 0 |
| Exeter | Duraloc | 553 | 8,252.5 | 120 | 1.45 | 1.21 | 1.74 | 0 |
| Exeter | Contemporary | 1,551 | 18,983.3 | 191 | 1.01 | 0.87 | 1.16 | 0 |
| Exeter | Exeter | 1,326 | 15,902.9 | 119 | 0.75 | 0.62 | 0.89 | 0 |
| Exeter | Osteolock | 836 | 11,796.1 | 80 | 0.68 | 0.54 | 0.84 | 0 |
| Exeter | CLS Expansion | 129 | 1,654.5 | 10 | 0.60 | 0.29 | 1.11 | 0 |



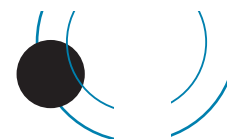
| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|------------------|--------------------------|---------|---------------|----------------|--------------------------|-------------------------------|------|-----------------|
| Exeter | Bio-clad poly | 113 | 1,276.0 | 7 | 0.55 | 0.22 | 1.13 | 0 |
| Exeter | Muller PE cup | 119 | 1,532.3 | 8 | 0.52 | 0.23 | 1.03 | 0 |
| Exeter | Morscher | 551 | 8,835.7 | 40 | 0.45 | 0.32 | 0.61 | 0 |
| Exeter | Trilogy | 213 | 3,155.4 | 14 | 0.44 | 0.24 | 0.74 | 0 |
| Exeter | Trident | 84 | 1,388.2 | 1 | 0.07 | 0.00 | 0.40 | 0 |
| Exeter V40 | Trabecular Metal Shell | 241 | 1,367.4 | 15 | 1.10 | 0.59 | 1.76 | 19 |
| Exeter V40 | Duraloc | 987 | 11,851.2 | 120 | 1.01 | 0.84 | 1.21 | 0 |
| Exeter V40 | Trident II Tritanium | 523 | 436.3 | 4 | 0.92 | 0.25 | 2.35 | 321 |
| Exeter V40 | G7 acetabular | 310 | 591.1 | 5 | 0.85 | 0.27 | 1.97 | 105 |
| Exeter V40 | Continuum TM | 2,887 | 14,944.8 | 109 | 0.73 | 0.60 | 0.88 | 177 |
| Exeter V40 | Bio-clad poly | 140 | 1,131.2 | 8 | 0.71 | 0.31 | 1.39 | 0 |
| Exeter V40 | R3 porous | 731 | 3,333.8 | 23 | 0.69 | 0.44 | 1.04 | 55 |
| Exeter V40 | PolarCup cemented | 51 | 152.8 | 1 | 0.65 | 0.00 | 3.06 | 8 |
| Exeter V40 | Exeter | 1,639 | 16,722.0 | 96 | 0.57 | 0.47 | 0.70 | 0 |
| Exeter V40 | Delta-TT Cup | 286 | 1,236.4 | 7 | 0.57 | 0.23 | 1.17 | 28 |
| Exeter V40 | Tritanium | 3,713 | 17,285.8 | 97 | 0.56 | 0.46 | 0.68 | 282 |
| Exeter V40 | Contemporary | 6,628 | 56,483.6 | 273 | 0.48 | 0.43 | 0.54 | 42 |
| Exeter V40 | Polymax | 84 | 214.0 | 1 | 0.47 | 0.01 | 2.60 | 5 |
| Exeter V40 | Pinnacle | 3,161 | 16,467.6 | 76 | 0.46 | 0.36 | 0.58 | 348 |
| Exeter V40 | Morscher | 630 | 8,024.4 | 36 | 0.45 | 0.31 | 0.62 | 0 |
| Exeter V40 | Trident | 12,521 | 82,734.5 | 365 | 0.44 | 0.40 | 0.49 | 1093 |
| Exeter V40 | Osteolock | 270 | 3,456.1 | 15 | 0.43 | 0.23 | 0.70 | 0 |
| Exeter V40 | Exeter X3 | 2,751 | 11,572.1 | 50 | 0.43 | 0.32 | 0.57 | 295 |
| Exeter V40 | CCB | 586 | 3,790.6 | 16 | 0.42 | 0.23 | 0.67 | 9 |
| Exeter V40 | Reflection cemented | 988 | 6,870.8 | 28 | 0.41 | 0.26 | 0.58 | 28 |
| Exeter V40 | Trilogy | 3,090 | 24,160.1 | 89 | 0.37 | 0.30 | 0.45 | 145 |
| Exeter V40 | RM Pressfit cup | 2,935 | 15,476.1 | 55 | 0.36 | 0.27 | 0.46 | 287 |
| Exeter V40 | Reflection porous | 476 | 4,728.2 | 15 | 0.32 | 0.17 | 0.51 | 0 |
| Exeter V40 | Muller PE cup | 94 | 974.5 | 3 | 0.31 | 0.06 | 0.90 | 0 |
| Exeter V40 | Monoblock Acetabular Cup | 123 | 1,743.7 | 5 | 0.29 | 0.09 | 0.67 | 0 |
| Exeter V40 | CLS Expansion | 88 | 1,077.8 | 2 | 0.19 | 0.02 | 0.67 | 0 |
| Exeter V40 | Weber | 53 | 606.3 | 1 | 0.16 | 0.00 | 0.92 | 0 |
| Exeter V40 | Fitmore | 1,121 | 6,678.0 | 10 | 0.15 | 0.07 | 0.27 | 54 |
| Exeter V40 | ZCA | 102 | 669.3 | 1 | 0.15 | 0.00 | 0.83 | 4 |
| Exeter V40 | ZCA all-poly cup | 110 | 555.2 | 0 | 0.00 | 0.00 | 0.66 | 1 |
| Friendly | Delta-TT Cup | 68 | 521.2 | 5 | 0.96 | 0.31 | 2.24 | 0 |
| Friendly | Delta-PF Cup | 172 | 2,003.8 | 5 | 0.25 | 0.08 | 0.58 | 3 |
| Furlong | Furlong | 66 | 889.6 | 7 | 0.79 | 0.32 | 1.62 | 0 |
| H-Max C | Delta-TT Cup | 110 | 280.8 | 5 | 1.78 | 0.58 | 4.16 | 21 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|-----------------------|-----------------------|---------|---------------|----------------|--------------------------|-------------------------------|------|-----------------|
| H-Max M | Delta-PF Cup | 71 | 637.0 | 8 | 1.26 | 0.54 | 2.47 | 0 |
| H-Max M | Delta-TT Cup | 86 | 798.4 | 4 | 0.50 | 0.14 | 1.28 | 0 |
| H-Max S | Delta-TT Cup | 898 | 4,435.9 | 37 | 0.83 | 0.59 | 1.15 | 72 |
| H-Max S | Delta-PF Cup | 252 | 1,013.7 | 8 | 0.79 | 0.31 | 1.49 | 26 |
| H-Max S | Trident | 59 | 165.7 | 1 | 0.60 | 0.02 | 3.36 | 4 |
| Lateral straight stem | Trilogy | 69 | 625.5 | 13 | 2.08 | 1.11 | 3.55 | 0 |
| Lateral straight stem | RM cup | 533 | 5,824.5 | 46 | 0.79 | 0.57 | 1.04 | 0 |
| Lateral straight stem | Muller PE cup | 753 | 7,526.4 | 42 | 0.56 | 0.40 | 0.75 | 1 |
| Lateral straight stem | Continuum TM | 78 | 596.4 | 3 | 0.50 | 0.07 | 1.34 | 0 |
| Lateral straight stem | Weber | 287 | 3,045.7 | 11 | 0.36 | 0.18 | 0.65 | 0 |
| Lateral straight stem | RM Pressfit cup | 173 | 1,468.1 | 3 | 0.20 | 0.04 | 0.60 | 0 |
| Lateral straight stem | ZCA | 98 | 853.1 | 1 | 0.12 | 0.00 | 0.65 | 0 |
| Lateral straight stem | ZCA all-poly cup | 70 | 528.9 | 0 | 0.00 | 0.00 | 0.70 | 0 |
| M/L Taper | Delta-TT Cup | 64 | 432.0 | 6 | 1.39 | 0.51 | 3.02 | 0 |
| M/L Taper | Continuum TM | 1,047 | 6,087.3 | 42 | 0.69 | 0.49 | 0.92 | 4 |
| M/L Taper | Trident | 333 | 1,327.6 | 7 | 0.53 | 0.21 | 1.09 | 29 |
| M/L Taper | Trilogy | 215 | 2,224.5 | 10 | 0.45 | 0.22 | 0.83 | 0 |
| Mallory-Head | M2A | 105 | 1,389.4 | 17 | 1.22 | 0.69 | 1.91 | 0 |
| MasterSL | Delta-TT Cup | 117 | 233.3 | 3 | 1.29 | 0.27 | 3.76 | 26 |
| Metafix | Trinity | 82 | 95.8 | 3 | 3.13 | 0.65 | 9.15 | 47 |
| MS 30 | G7 acetabular | 92 | 59.7 | 2 | 3.35 | 0.41 | 12.1 | 68 |
| MS 30 | Contemporary | 128 | 1,296.2 | 12 | 0.93 | 0.48 | 1.62 | 0 |
| MS 30 | Duraloc | 55 | 824.9 | 7 | 0.85 | 0.30 | 1.67 | 0 |
| MS 30 | Morscher | 787 | 10,520.9 | 66 | 0.63 | 0.48 | 0.79 | 0 |
| MS 30 | RM Pressfit cup | 90 | 868.8 | 5 | 0.58 | 0.16 | 1.26 | 0 |
| MS 30 | Continuum TM | 466 | 2,388.2 | 8 | 0.33 | 0.14 | 0.66 | 29 |
| MS 30 | Muller PE cup | 462 | 4,593.9 | 15 | 0.33 | 0.18 | 0.54 | 0 |
| MS 30 | Fitmore | 2,550 | 17,973.4 | 53 | 0.29 | 0.22 | 0.39 | 193 |
| MS 30 | Trilogy | 383 | 2,519.9 | 6 | 0.24 | 0.08 | 0.49 | 23 |
| MS 30 | ZCA all-poly cup | 94 | 640.1 | 1 | 0.16 | 0.00 | 0.87 | 0 |
| MS 30 | Pinnacle | 105 | 233.6 | 0 | 0.00 | 0.00 | 1.58 | 39 |
| Omnifit | Trident | 149 | 2,024.9 | 13 | 0.64 | 0.32 | 1.07 | 0 |
| Optimys | RM Pressfit cup | 280 | 520.3 | 4 | 0.77 | 0.16 | 1.97 | 84 |
| Polarstem uncemented | RM Pressfit cup | 133 | 138.4 | 1 | 0.72 | 0.02 | 4.03 | 66 |
| Polarstem uncemented | Reflection porous | 335 | 2,605.0 | 16 | 0.61 | 0.35 | 1.00 | 0 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|------------------------|--------------------------|---------|---------------|----------------|--------------------------|-------------------------------|-------|-----------------|
| Polarstem uncemented | R3 porous | 2,014 | 7,889.0 | 47 | 0.60 | 0.44 | 0.79 | 271 |
| Prodigy | Duraloc | 113 | 1,561.5 | 25 | 1.60 | 1.04 | 2.36 | 0 |
| Quadra-C | Acetabular Shell | 150 | 143.9 | 2 | 1.39 | 0.17 | 5.02 | 85 |
| Quadra-H | Acetabular Shell | 207 | 173.4 | 8 | 4.61 | 1.81 | 8.71 | 119 |
| SL modular stem | RM cup | 322 | 4,878.7 | 42 | 0.86 | 0.62 | 1.16 | 0 |
| SL modular stem | Muller PE cup | 83 | 1,144.6 | 3 | 0.26 | 0.05 | 0.77 | 0 |
| SL monoblock | Muller PE cup | 488 | 5,681.6 | 27 | 0.48 | 0.31 | 0.68 | 0 |
| Spectron | Duraloc | 1,152 | 14,568.4 | 196 | 1.35 | 1.16 | 1.54 | 0 |
| Spectron | Reflection cemented | 2,958 | 31,048.2 | 372 | 1.20 | 1.08 | 1.33 | 0 |
| Spectron | Muller PE cup | 66 | 677.3 | 8 | 1.18 | 0.51 | 2.33 | 0 |
| Spectron | Morscher | 210 | 2,953.0 | 33 | 1.12 | 0.76 | 1.55 | 0 |
| Spectron | Reflection porous | 2,755 | 30,457.4 | 261 | 0.86 | 0.75 | 0.97 | 0 |
| Spectron | Trident | 78 | 968.8 | 6 | 0.62 | 0.20 | 1.28 | 0 |
| Spectron | Fitmore | 78 | 1,038.8 | 5 | 0.48 | 0.13 | 1.06 | 0 |
| Spectron | Biomex acet shell porous | 68 | 1,106.2 | 5 | 0.45 | 0.15 | 1.05 | 0 |
| Spectron | Mallory-Head | 152 | 1,972.8 | 8 | 0.41 | 0.18 | 0.80 | 0 |
| Spectron | R3 porous | 448 | 3,136.4 | 12 | 0.38 | 0.19 | 0.65 | 7 |
| S-Rom | ASR | 130 | 867.0 | 96 | 11.07 | 8.92 | 13.46 | 0 |
| S-Rom | Ultima | 78 | 1,372.8 | 14 | 1.02 | 0.56 | 1.71 | 0 |
| S-Rom | Pinnacle | 389 | 4,283.5 | 40 | 0.93 | 0.66 | 1.26 | 8 |
| Standard straight stem | RM cup | 138 | 1,681.5 | 13 | 0.77 | 0.41 | 1.32 | 0 |
| Standard straight stem | Muller PE cup | 632 | 6,129.6 | 23 | 0.38 | 0.24 | 0.56 | 0 |
| Standard straight stem | Weber | 134 | 1,364.3 | 4 | 0.29 | 0.08 | 0.75 | 0 |
| Standard straight stem | ZCA all-poly cup | 50 | 362.7 | 1 | 0.28 | 0.00 | 1.54 | 0 |
| Standard straight stem | RM Pressfit cup | 137 | 1,234.6 | 1 | 0.08 | 0.00 | 0.45 | 0 |
| Stemsys | Agilis Ti-por | 545 | 2,463.0 | 20 | 0.81 | 0.50 | 1.25 | 31 |
| Stemsys | Polymax | 167 | 526.5 | 4 | 0.76 | 0.21 | 1.95 | 21 |
| Stemsys | Delta-PF Cup | 548 | 1,989.9 | 10 | 0.50 | 0.22 | 0.89 | 84 |
| Stemsys | Fixa Ti Por | 879 | 4,245.4 | 21 | 0.49 | 0.31 | 0.76 | 43 |
| Stemsys | RM Pressfit cup | 375 | 1,795.7 | 7 | 0.39 | 0.16 | 0.80 | 20 |
| Stemsys | DeltaMotion Cup | 541 | 3,430.1 | 8 | 0.23 | 0.10 | 0.46 | 15 |
| Stemsys cemented | Delta-PF Cup | 79 | 272.6 | 0 | 0.00 | 0.00 | 1.35 | 15 |
| Stemsys cemented | RM Pressfit cup | 82 | 272.5 | 0 | 0.00 | 0.00 | 1.35 | 5 |
| Summit | ASR | 88 | 830.1 | 38 | 4.58 | 3.24 | 6.28 | 0 |
| Summit | Pinnacle | 2,575 | 17,797.4 | 118 | 0.66 | 0.55 | 0.79 | 161 |
| Summit | Trilogy | 186 | 1,587.2 | 7 | 0.44 | 0.18 | 0.91 | 8 |



| Femur Prosthesis | Acetabular Prosthesis | No. Ops | Sum comp. Yrs | Number revised | Rate/100 component-years | Exact 95% confidence interval | | Procedures 2020 |
|-----------------------|--------------------------|---------|---------------|----------------|--------------------------|-------------------------------|-------|-----------------|
| Summit | Duraloc | 101 | 1,368.6 | 6 | 0.44 | 0.16 | 0.95 | 0 |
| Synergy Porous | BHR Acetabular Cup | 114 | 1,160.6 | 42 | 3.62 | 2.61 | 4.89 | 0 |
| Synergy Porous | R3 porous | 1,841 | 11,219.8 | 64 | 0.57 | 0.44 | 0.73 | 12 |
| Synergy Porous | Reflection porous | 1,239 | 13,964.3 | 48 | 0.34 | 0.25 | 0.46 | 1 |
| Synergy Porous | Delta-PF Cup | 96 | 955.8 | 2 | 0.21 | 0.03 | 0.76 | 0 |
| Synergy Porous | Continuum TM | 55 | 230.6 | 0 | 0.00 | 0.00 | 1.60 | 0 |
| Taperloc Complete | Trident | 56 | 23.5 | 1 | 4.25 | 0.11 | 23.66 | 50 |
| Taperloc Complete | Continuum TM | 242 | 445.3 | 6 | 1.35 | 0.43 | 2.78 | 62 |
| Taperloc Complete | G7 acetabular | 431 | 1,020.3 | 9 | 0.88 | 0.40 | 1.67 | 107 |
| Taperloc Complete | RM Pressfit cup | 326 | 751.7 | 6 | 0.80 | 0.25 | 1.65 | 64 |
| Taperloc Complete | Delta-TT Cup | 109 | 197.3 | 0 | 0.00 | 0.00 | 1.87 | 32 |
| Trabecular Metal Stem | Continuum TM | 487 | 3,012.6 | 18 | 0.60 | 0.35 | 0.94 | 15 |
| Trabecular Metal Stem | Monoblock Acetabular Cup | 74 | 958.6 | 3 | 0.31 | 0.04 | 0.84 | 0 |
| Tri-Lock BPS | Pinnacle | 93 | 545.9 | 3 | 0.55 | 0.11 | 1.61 | 29 |
| TwinSys cemented | Pinnacle | 119 | 454.6 | 10 | 2.20 | 0.98 | 3.90 | 19 |
| TwinSys cemented | Selexys TPS | 65 | 549.4 | 6 | 1.09 | 0.40 | 2.38 | 0 |
| TwinSys cemented | CCB | 454 | 2,793.5 | 22 | 0.79 | 0.49 | 1.19 | 5 |
| TwinSys cemented | Continuum TM | 142 | 629.8 | 4 | 0.64 | 0.17 | 1.63 | 21 |
| TwinSys cemented | RM Pressfit cup | 2,193 | 11,837.2 | 54 | 0.46 | 0.34 | 0.59 | 147 |
| TwinSys cemented | RM cup | 148 | 1,663.2 | 6 | 0.36 | 0.11 | 0.74 | 0 |
| TwinSys cemented | Reflection porous | 59 | 285.9 | 0 | 0.00 | 0.00 | 1.29 | 0 |
| TwinSys uncemented | Selexys TPS | 1,231 | 12,415.1 | 145 | 1.17 | 0.99 | 1.37 | 0 |
| TwinSys uncemented | RM cup | 122 | 1,227.4 | 11 | 0.90 | 0.45 | 1.60 | 0 |
| TwinSys uncemented | RM Pressfit cup | 5,190 | 37,126.9 | 237 | 0.64 | 0.56 | 0.72 | 136 |
| TwinSys uncemented | Trilogy | 209 | 2,152.5 | 12 | 0.56 | 0.27 | 0.94 | 0 |
| TwinSys uncemented | Continuum TM | 137 | 1,060.9 | 5 | 0.47 | 0.15 | 1.10 | 2 |
| TwinSys uncemented | Delta-PF Cup | 379 | 3,699.7 | 4 | 0.11 | 0.02 | 0.26 | 9 |
| Versys | Trilogy | 272 | 4,256.2 | 19 | 0.45 | 0.27 | 0.70 | 0 |
| Versys cemented | ZCA | 391 | 4,464.2 | 32 | 0.72 | 0.49 | 1.01 | 0 |
| Versys cemented | Trilogy | 238 | 2,820.6 | 8 | 0.28 | 0.12 | 0.56 | 0 |
| Wagner cone stem | Continuum TM | 55 | 237.3 | 2 | 0.84 | 0.10 | 3.04 | 4 |
| Wagner cone stem | Fitmore | 78 | 936.7 | 4 | 0.43 | 0.12 | 1.09 | 2 |

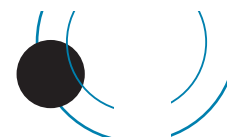


Revision vs Bearing Surface Articulations vs Head sizes 28mm, 32mm, 36mm & >36mm

| Size | Surfaces | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% Confidence Interval | |
|------|----------|----------|--------------------|----------------|--------------------------|-------------------------------|-------|
| <=28 | CC | 814 | 9,354.7 | 60 | 0.64 | 0.49 | 0.83 |
| <=28 | CM | 85 | 324.4 | 5 | 1.54 | 0.42 | 3.38 |
| <=28 | CP | 12,655 | 129,327.8 | 874 | 0.68 | 0.63 | 0.72 |
| <=28 | MM | 3,192 | 45,760.9 | 351 | 0.77 | 0.69 | 0.85 |
| <=28 | MP | 47,162 | 486,723.1 | 3,456 | 0.71 | 0.69 | 0.73 |
| 32 | CC | 4,049 | 37,618.7 | 186 | 0.49 | 0.42 | 0.57 |
| 32 | CP | 19,335 | 84,974.3 | 454 | 0.53 | 0.49 | 0.59 |
| 32 | MM | 480 | 5,585.3 | 50 | 0.90 | 0.66 | 1.18 |
| 32 | MP | 34,571 | 186,729.0 | 1,060 | 0.57 | 0.53 | 0.60 |
| 36 | CC | 8,114 | 60,637.0 | 322 | 0.53 | 0.47 | 0.59 |
| 36 | CM | 441 | 4,397.1 | 31 | 0.71 | 0.47 | 0.99 |
| 36 | CP | 10,119 | 38,030.1 | 238 | 0.63 | 0.55 | 0.71 |
| 36 | MM | 1,004 | 11,910.5 | 149 | 1.25 | 1.06 | 1.47 |
| 36 | MP | 5,191 | 22,617.5 | 161 | 0.71 | 0.61 | 0.83 |
| >36 | CC | 2,161 | 12,528.5 | 61 | 0.49 | 0.37 | 0.62 |
| >36 | CM | 7 | 76.1 | 0 | 0.00 | 0.00 | 4.85 |
| >36 | CP | 32 | 60.1 | 2 | 3.33 | 0.00 | 12.02 |
| >36 | MM | 1,647 | 16,663.8 | 580 | 3.48 | 3.20 | 3.77 |
| >36 | MP | 34 | 216.9 | 1 | 0.46 | 0.00 | 2.57 |

Summary Revision Rates vs Head Size

| Size | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% Confidence Interval | |
|------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| <=28 | 64,552 | 677,835.4 | 4,746 | 0.70 | 0.68 | 0.72 |
| 32 | 58,694 | 316,170.8 | 1,750 | 0.55 | 0.53 | 0.58 |
| 36 | 25,100 | 138,262.4 | 901 | 0.65 | 0.61 | 0.70 |
| >36 | 3,919 | 29,637.4 | 644 | 2.17 | 2.01 | 2.35 |



Revision Comparison Standard vs Cross linked Polyethylene

| Surfaces | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% Confidence Interval | |
|----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| CC | 15,167 | 120,212.9 | 629 | 0.52 | 0.48 | 0.57 |
| CM | 536 | 4,807.4 | 37 | 0.77 | 0.53 | 1.05 |
| CP | 42,323 | 252,659.8 | 1,577 | 0.62 | 0.59 | 0.66 |
| PS | 7,309 | 90,090.6 | 715 | 0.79 | 0.74 | 0.85 |
| PX | 35,014 | 162,569.3 | 862 | 0.53 | 0.50 | 0.57 |
| MM | 7,309 | 90,090.6 | 715 | 0.79 | 0.74 | 0.85 |
| MP | 86,976 | 696,402.9 | 4,687 | 0.67 | 0.65 | 0.69 |
| PS | 37,316 | 385,452.9 | 3,003 | 0.78 | 0.75 | 0.81 |
| PX | 49,660 | 310,950.0 | 1,684 | 0.54 | 0.52 | 0.57 |

Revision vs Bearing Surfaces of Uncemented Prostheses

| Surfaces | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% confidence Interval | |
|----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| CC | 11,802 | 95,159.3 | 517 | 0.54 | 0.50 | 0.59 |
| CM | 499 | 4,693.0 | 34 | 0.72 | 0.50 | 1.01 |
| CP | 27,914 | 163,038.7 | 1,024 | 0.63 | 0.59 | 0.67 |
| MM | 5,396 | 69,855.4 | 1,025 | 1.47 | 1.38 | 1.56 |
| MP | 17,569 | 132,324.4 | 975 | 0.74 | 0.69 | 0.78 |

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 | 856 | 7,125.0 | 51 | 0.72 | 0.53 | 0.93 |
| MM | 46 | 423.1 | 3 | 0.71 | 0.15 | 2.07 |
| MP | 25,934 | 230,873.5 | 1,523 | 0.66 | 0.63 | 0.69 |

Revision vs Bearing Surfaces of Hybrid Prostheses

| Surfaces | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% Confidence Interval | |
|----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| CC | 3,365 | 25,053.6 | 112 | 0.45 | 0.37 | 0.54 |
| CM | 37 | 114.4 | 2 | 1.75 | 0.21 | 6.32 |
| CP | 13,553 | 82,496.2 | 499 | 0.60 | 0.55 | 0.66 |
| MM | 884 | 9,657.7 | 104 | 1.08 | 0.88 | 1.30 |
| MP | 43,473 | 333,204.9 | 2,180 | 0.65 | 0.63 | 0.68 |



Summary for Revision vs Bearing Surfaces

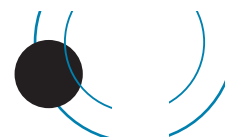
| Surfaces | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component-years | Exact 95% Confidence Interval | |
|----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| CC | 15,167 | 120,212.9 | 629 | 0.52 | 0.48 | 0.57 |
| CM | 536 | 4,807.4 | 37 | 0.77 | 0.53 | 1.05 |
| CP | 42,323 | 252,659.8 | 1,577 | 0.62 | 0.59 | 0.66 |
| MM | 6,326 | 79,936.3 | 1,133 | 1.42 | 1.34 | 1.50 |
| MP | 86,976 | 696,402.9 | 4,687 | 0.67 | 0.65 | 0.69 |

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 | 3,780.5 | 33 | 0.87 | 0.60 | 1.23 |
| | PS | 6,247 | 50,331.9 | 284 | 0.56 | 0.50 | 0.63 |
| | PX | 7,294 | 30,753.3 | 154 | 0.50 | 0.42 | 0.59 |
| | P | 13,541 | 81,085.1 | 438 | 0.54 | 0.49 | 0.59 |
| Pinnacle | CC | 3,484 | 25,583.2 | 125 | 0.49 | 0.41 | 0.58 |
| | MM | 1,061 | 12,905.2 | 163 | 1.26 | 1.08 | 1.47 |
| | PS | 24 | 177.9 | 3 | 1.69 | 0.35 | 4.93 |
| | PX | 18,581 | 85,428.9 | 499 | 0.58 | 0.53 | 0.64 |
| | P | 18,605 | 85,606.8 | 502 | 0.59 | 0.54 | 0.64 |
| R3 porous | CC | 1,008 | 7,001.4 | 22 | 0.31 | 0.20 | 0.48 |
| | MM | 110 | 921.1 | 52 | 5.65 | 4.22 | 7.40 |
| | P | 4,424 | 20,310.1 | 118 | 0.58 | 0.48 | 0.70 |
| Trident | CC | 2,543 | 29,149.3 | 123 | 0.42 | 0.35 | 0.50 |
| | MM | 109 | 281.4 | 3 | 1.07 | 0.22 | 3.12 |
| | PS | 1 | 14.9 | 0 | 0.00 | 0.00 | 24.72 |
| | PX | 14,764 | 97,608.8 | 492 | 0.50 | 0.46 | 0.55 |
| | P | 14,765 | 97,623.7 | 492 | 0.50 | 0.46 | 0.55 |
| Tritanium | CC | 112 | 747.9 | 1 | 0.13 | 0.00 | 0.74 |
| | MM | 100 | 352.7 | 6 | 1.70 | 0.62 | 3.70 |
| | P | 5,484 | 25,950.8 | 150 | 0.58 | 0.49 | 0.68 |
| Trilogy | CC | 69 | 992.8 | 6 | 0.60 | 0.22 | 1.32 |
| | MM | 5 | 63.8 | 0 | 0.00 | 0.00 | 5.78 |
| | PS | 158 | 2,413.9 | 15 | 0.62 | 0.35 | 1.02 |
| | PX | 6,566 | 55,577.0 | 276 | 0.50 | 0.44 | 0.56 |
| | P | 6,724 | 57,991.0 | 291 | 0.50 | 0.45 | 0.56 |

Revision vs Monoblock Femoral Stems

| No. Ops | Observed comp. years | Number revised | Rate/100 Component years | Exact 95% confidence interval | |
|---------|----------------------|----------------|--------------------------|-------------------------------|------|
| 1,297 | 15,951.5 | 87 | 0.55 | 0.44 | 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 | 64 | 192.8 | 2 | 1.04 | 0.13 | 3.75 |
| Cemented No Liner | 27,439 | 244,007.4 | 1,630 | 0.67 | 0.64 | 0.70 |
| Uncemented Liner | 100,742 | 716,952.0 | 4,889 | 0.68 | 0.66 | 0.70 |
| Uncemented No Liner | 23,083 | 192,867.1 | 1,542 | 0.80 | 0.76 | 0.84 |

Revision vs Age Bands

| Age Bands | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% Confidence Interval | |
|-----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| <40 | 2,421 | 23,048.4 | 238 | 1.03 | 0.90 | 1.17 |
| 40-54 | 19,524 | 174,582.8 | 1,752 | 1.00 | 0.96 | 1.05 |
| 55-64 | 38,741 | 324,494.9 | 2,602 | 0.80 | 0.77 | 0.83 |
| 65-74 | 52,114 | 402,732.0 | 2,427 | 0.60 | 0.58 | 0.63 |
| >=75 | 41,399 | 257,424.2 | 1,212 | 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 | 835 | 6,354.4 | 44 | 0.69 | 0.50 | 0.92 |
| | 40-54 | 5,026 | 40,659.1 | 244 | 0.60 | 0.53 | 0.68 |
| | 55-64 | 6,091 | 49,673.6 | 219 | 0.44 | 0.38 | 0.50 |
| | 65-74 | 2,883 | 21,670.6 | 112 | 0.52 | 0.43 | 0.62 |
| | >=75 | 332 | 1,855.3 | 10 | 0.54 | 0.26 | 0.99 |
| CM | <40 | 13 | 127.7 | 2 | 1.57 | 0.19 | 5.66 |
| | 40-54 | 178 | 1,713.2 | 10 | 0.58 | 0.28 | 1.07 |
| | 55-64 | 221 | 2,071.1 | 19 | 0.92 | 0.53 | 1.40 |
| | 65-74 | 96 | 753.9 | 4 | 0.53 | 0.14 | 1.36 |
| | >=75 | 28 | 141.6 | 1 | 0.71 | 0.00 | 3.93 |
| CP | <40 | 700 | 5,175.6 | 58 | 1.12 | 0.85 | 1.45 |
| | 40-54 | 6,947 | 47,233.8 | 388 | 0.82 | 0.74 | 0.91 |
| | 55-64 | 14,705 | 92,178.4 | 563 | 0.61 | 0.56 | 0.66 |
| | 65-74 | 14,245 | 81,552.3 | 419 | 0.51 | 0.47 | 0.56 |
| | >=75 | 5,726 | 26,519.7 | 146 | 0.55 | 0.46 | 0.65 |
| MM | <40 | 427 | 6,363.9 | 77 | 1.21 | 0.95 | 1.51 |
| | 40-54 | 2,472 | 33,692.0 | 478 | 1.42 | 1.29 | 1.55 |
| | 55-64 | 2,394 | 30,044.8 | 470 | 1.56 | 1.42 | 1.71 |
| | 65-74 | 753 | 8,093.4 | 91 | 1.12 | 0.91 | 1.38 |
| | >=75 | 280 | 1,742.1 | 16 | 0.92 | 0.52 | 1.49 |



| Bearing Surface | Age Bands | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% Confidence Interval | |
|-----------------|-----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| MP | <40 | 409 | 4,670.1 | 51 | 1.09 | 0.80 | 1.42 |
| | 40-54 | 4,621 | 47,814.7 | 597 | 1.25 | 1.15 | 1.35 |
| | 55-64 | 14,756 | 143,997.5 | 1,282 | 0.89 | 0.84 | 0.94 |
| | 65-74 | 33,091 | 279,590.8 | 1,738 | 0.62 | 0.59 | 0.65 |
| | >=75 | 34,099 | 220,329.8 | 1,010 | 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 | 82,598 | 630,945.2 | 3,933 | 0.62 | 0.60 | 0.64 |
| M | 71,601 | 551,337.1 | 4,298 | 0.78 | 0.76 | 0.80 |

Revision vs Surgeon Annual Workload

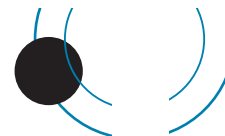
| Operations per year | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% confidence interval | |
|---------------------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| <10 | 2,006 | 16,195.2 | 162 | 1.00 | 0.85 | 1.17 |
| 10-24 | 15,322 | 124,779.7 | 923 | 0.74 | 0.69 | 0.79 |
| 25-49 | 63,112 | 486,707.1 | 3,630 | 0.75 | 0.72 | 0.77 |
| 50-74 | 36,460 | 271,393.3 | 1,667 | 0.61 | 0.58 | 0.64 |
| 75-99 | 19,199 | 119,980.2 | 727 | 0.61 | 0.56 | 0.65 |
| >=100 | 18,100 | 163,226.8 | 1,122 | 0.69 | 0.65 | 0.73 |

Revision vs Approach

| Approach | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% confidence interval | |
|-----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| Anterior | 5,149 | 44,847.6 | 341 | 0.76 | 0.68 | 0.84 |
| Posterior | 103,385 | 763,871.2 | 5,372 | 0.70 | 0.68 | 0.72 |
| Lateral | 34,985 | 299,423.4 | 1,940 | 0.65 | 0.62 | 0.68 |
| Troch | 163 | 1,260.3 | 16 | 1.27 | 0.73 | 2.06 |

Revision vs Arthroplasty Fixation

| Fixation | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 Component years | Exact 95% confidence interval | |
|------------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| Cemented | 28,304 | 255,437.6 | 1,675 | 0.66 | 0.62 | 0.69 |
| Uncemented | 63,856 | 470,288.6 | 3,616 | 0.77 | 0.74 | 0.79 |
| Hybrid | 62,039 | 456,556.1 | 2,940 | 0.64 | 0.62 | 0.67 |



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 | 78 | 806.0 | 10 | 1.24 | 0.55 | 2.20 |
| 40-54 | 707 | 7,760.1 | 155 | 2.00 | 1.70 | 2.34 |
| 55-64 | 2,702 | 31,392.0 | 378 | 1.20 | 1.09 | 1.33 |
| 65-74 | 9,579 | 101,858.1 | 702 | 0.69 | 0.64 | 0.74 |
| >=75 | 15,238 | 113,621.4 | 430 | 0.38 | 0.34 | 0.42 |
| Uncemented | | | | | | |
| <40 | 1,910 | 17,666.3 | 178 | 1.01 | 0.86 | 1.17 |
| 40-54 | 14,536 | 125,498.8 | 1,113 | 0.89 | 0.84 | 0.94 |
| 55-64 | 23,025 | 176,277.5 | 1,357 | 0.77 | 0.73 | 0.81 |
| 65-74 | 17,683 | 115,365.6 | 718 | 0.62 | 0.58 | 0.67 |
| >=75 | 6,702 | 35,480.3 | 250 | 0.70 | 0.62 | 0.80 |
| Hybrid | | | | | | |
| <40 | 433 | 4,576.1 | 50 | 1.09 | 0.80 | 1.43 |
| 40-54 | 4,281 | 41,323.9 | 484 | 1.17 | 1.07 | 1.28 |
| 55-64 | 13,014 | 116,825.4 | 867 | 0.74 | 0.69 | 0.79 |
| 65-74 | 24,852 | 185,508.2 | 1,007 | 0.54 | 0.51 | 0.58 |
| >=75 | 19,459 | 108,322.4 | 532 | 0.49 | 0.45 | 0.53 |

Revision vs ASA Status

| ASA Class | No. Ops. | Observed comp. years | Number revised | Rate/100 Component years | Exact 95% confidence interval | |
|-----------|----------|----------------------|----------------|--------------------------|-------------------------------|------|
| 1 | 18,607 | 133,252.4 | 873 | 0.66 | 0.61 | 0.70 |
| 2 | 71,577 | 452,139.1 | 2,702 | 0.60 | 0.58 | 0.62 |
| 3 | 29,033 | 153,663.3 | 1,058 | 0.69 | 0.65 | 0.73 |
| 4 | 1,057 | 3,822.4 | 38 | 0.99 | 0.70 | 1.36 |

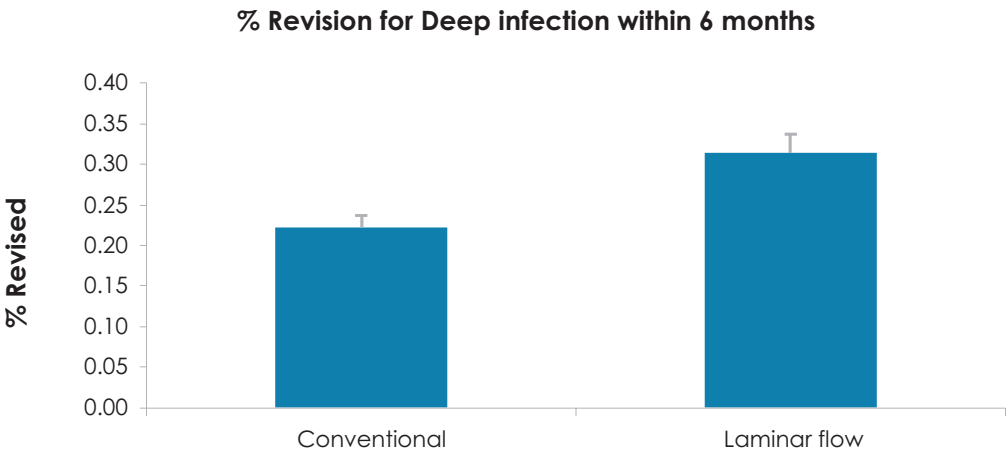
Revision vs BMI Status

| BMI | No. Ops. | Observed comp. years | Number Revised | Rate/100 component years | Exact 95% Confidence Interval | |
|---------|----------|----------------------|----------------|--------------------------|-------------------------------|------|
| < 19 | 674 | 2,645.3 | 18 | 0.68 | 0.40 | 1.08 |
| 19 - 24 | 13,329 | 58,325.1 | 285 | 0.49 | 0.43 | 0.55 |
| 25 - 29 | 24,320 | 107,475.1 | 581 | 0.54 | 0.50 | 0.59 |
| 30 - 39 | 23,472 | 100,475.9 | 631 | 0.63 | 0.58 | 0.68 |
| 40+ | 2,589 | 10,421.3 | 113 | 1.08 | 0.89 | 1.30 |

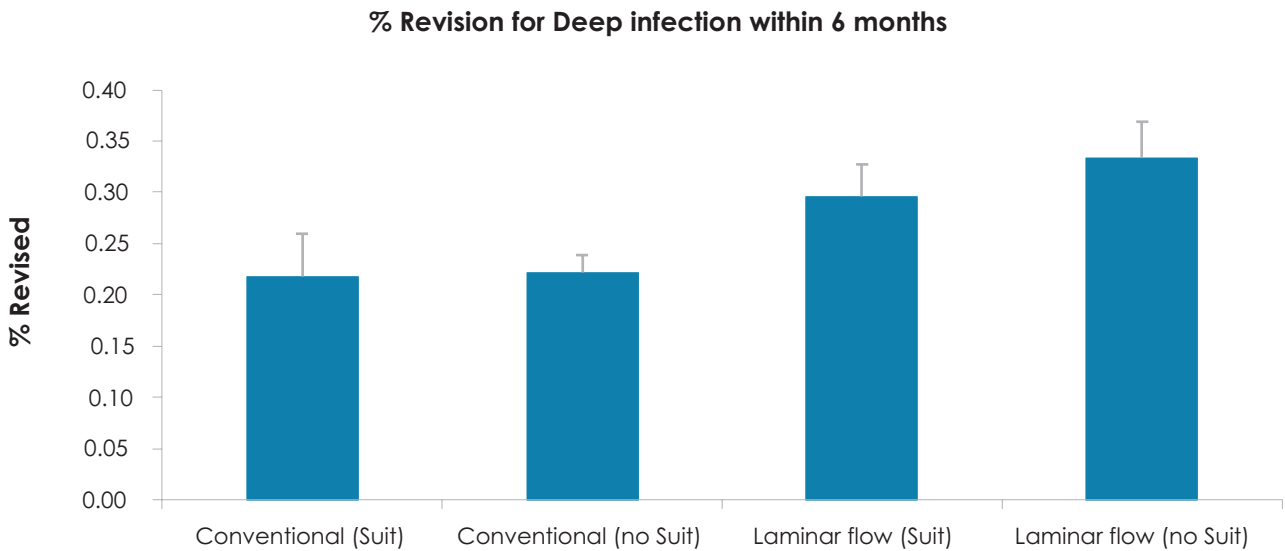


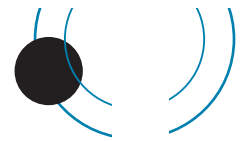
Revision for Deep Infection within six months vs Theatre Environment

| Theatre | Total number | Number Revised | % | Standard error |
|--------------|--------------|----------------|---------|----------------|
| Conventional | 89,894 | 199 | 0.22137 | 0.01568 |
| Laminar flow | 55,422 | 174 | 0.31395 | 0.02376 |



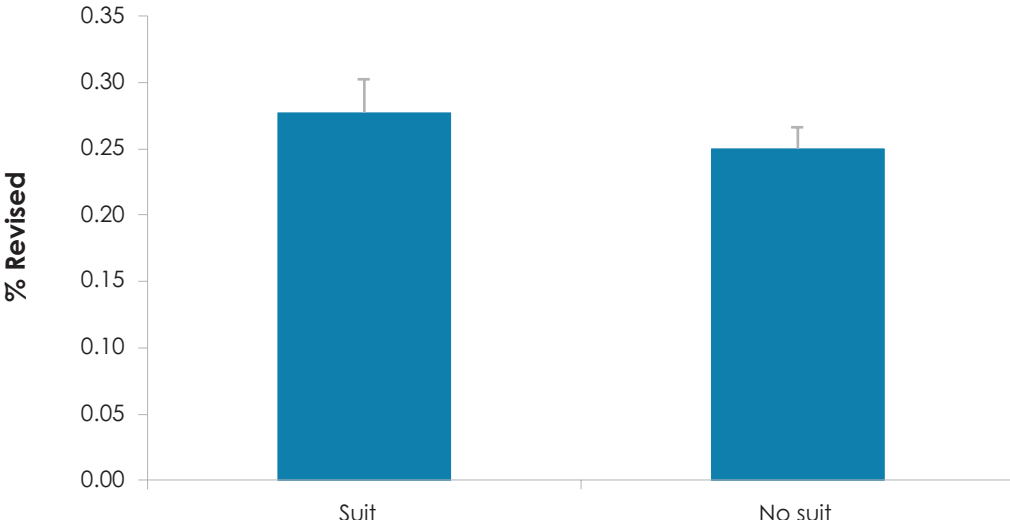
| | | Total number | Number revised | % | Standard error |
|--------------|---------|--------------|----------------|---------|----------------|
| Conventional | Suit | 12,403 | 27 | 0.21769 | 0.04185 |
| | no suit | 77,491 | 172 | 0.22196 | 0.01691 |
| Laminar flow | Suit | 28,752 | 85 | 0.29563 | 0.03202 |
| | no suit | 26,670 | 89 | 0.33371 | 0.03531 |



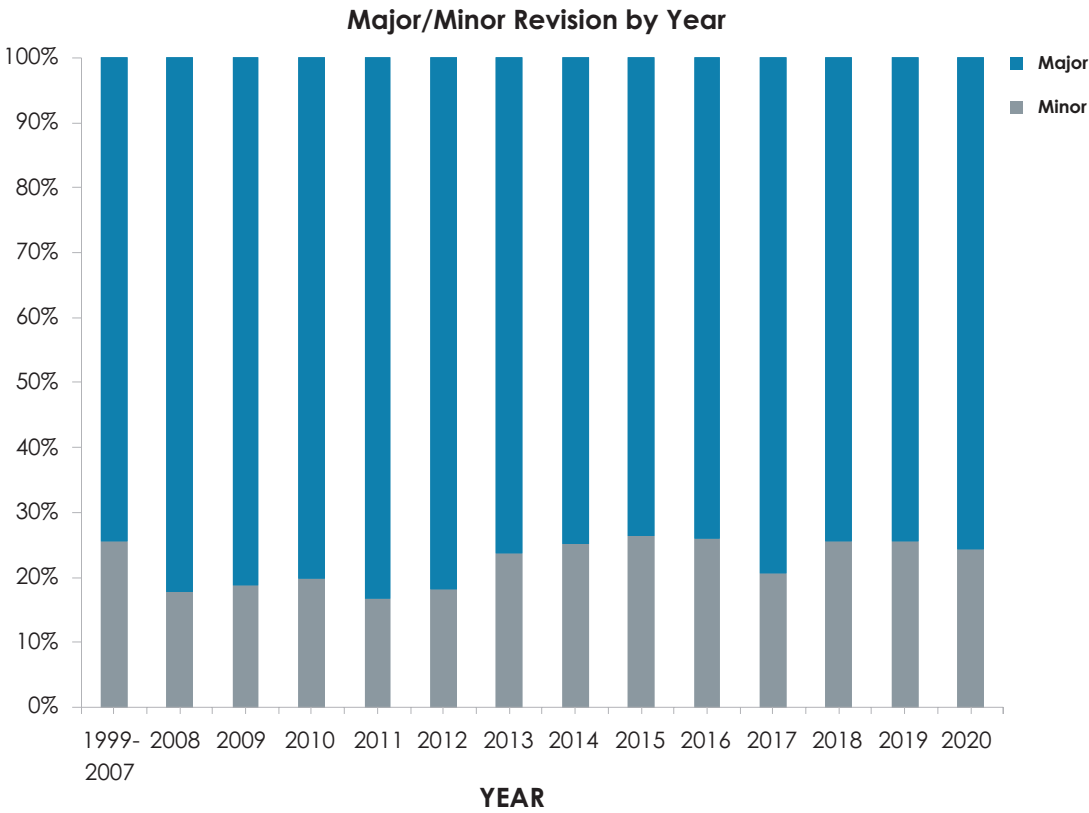


| | Total number | Number revised | % | Standard error |
|---------|--------------|----------------|---------|----------------|
| Suit | 42,931 | 119 | 0.27719 | 0.02537 |
| No Suit | 104,645 | 262 | 0.25037 | 0.01545 |

% Revision for Deep infection within 6 months



Comparison of Major vs Minor Revisions by Year

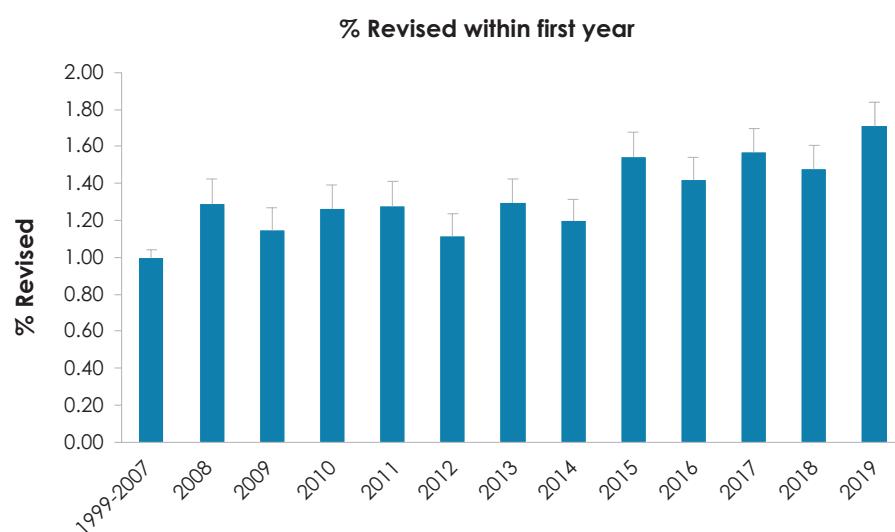


A major revision is defined as revision of acetabulum and/or femur including any of minor components and minor revision as change of head and/or liner only.

Re-revisions for Major vs Minor revisions

| | No. Ops. | Observed comp. years | Number Re-revised | Rate/100 component years | Exact 95% confidence interval | |
|-------|----------|----------------------|-------------------|--------------------------|-------------------------------|------|
| Minor | 1,894 | 9,866.7 | 361 | 3.66 | 3.29 | 4.06 |
| Major | 6,296 | 34,089.4 | 888 | 2.60 | 2.44 | 2.78 |

Percentage of hips revised in the first year



Resurfacing Arthroplasty

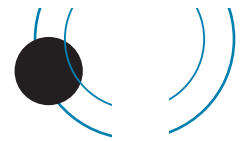
| No. Ops. | Observed component years | Number revised | Rate/100 component years | Exact 95% Confidence Interval | |
|----------|--------------------------|----------------|--------------------------|-------------------------------|------|
| 2,123 | 17,724.8 | 168 | 0.95 | 0.81 | 1.10 |

Resurfacing Prosthesis vs Revision Rate

| Prosthesis | No. Ops. | Observed comp. years | Number Revised | Rate/100 component years | Exact 95% Confidence Interval | |
|----------------------------|----------|----------------------|----------------|--------------------------|-------------------------------|-------|
| Adept | 4 | 51.1 | 0 | 0.00 | 0.00 | 7.22 |
| ASR | 132 | 1,502.0 | 44 | 2.93 | 2.13 | 3.93 |
| BHR | 1,940 | 15,714.8 | 116 | 0.74 | 0.61 | 0.89 |
| BMHR | 28 | 267.2 | 2 | 0.75 | 0.09 | 2.70 |
| Conserve Superfinish | 3 | 34.6 | 0 | 0.00 | 0.00 | 10.66 |
| Durom | 4 | 62.5 | 0 | 0.00 | 0.00 | 5.90 |
| Mitch TRH Resurfacing Head | 12 | 92.6 | 6 | 6.48 | 2.06 | 13.36 |

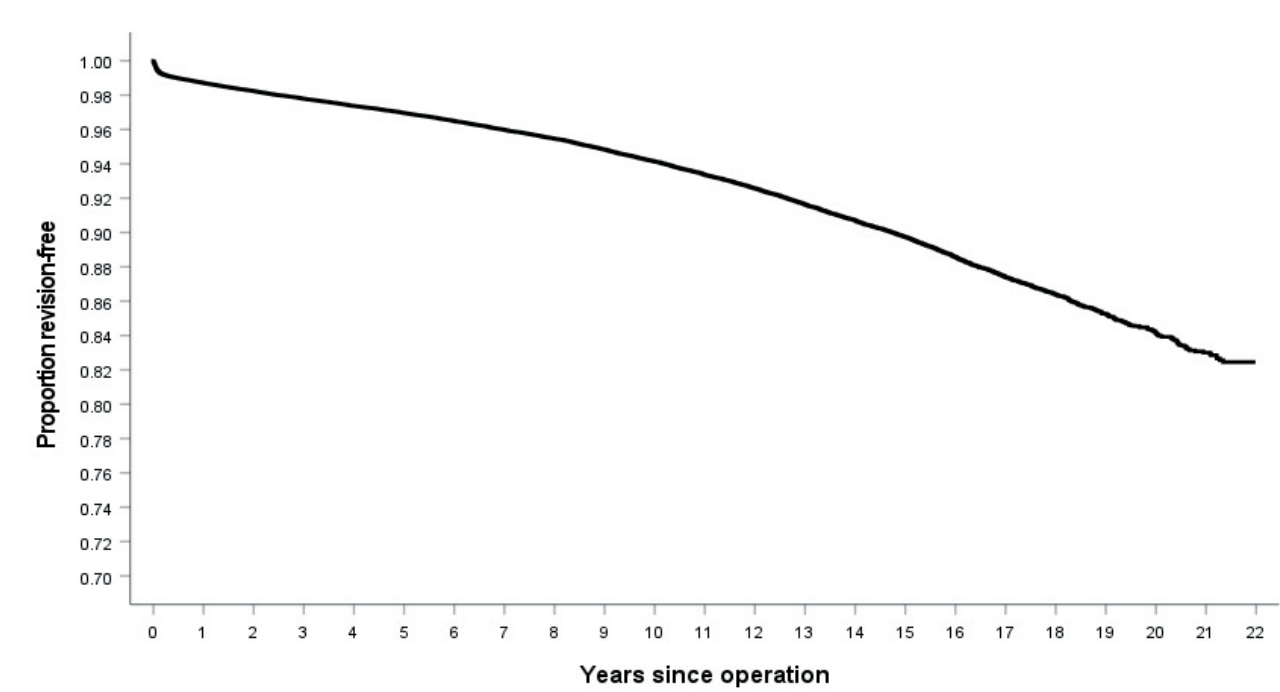
Head size vs Revision Rate

| Head size | No. Ops. | Observed comp. yrs | Number Revised | Rate/100 component years | Exact 95% Confidence Interval | |
|-----------|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| <=44 | 99 | 966.3 | 33 | 3.41 | 2.35 | 4.80 |
| 45-49 | 381 | 3,604.9 | 54 | 1.50 | 1.11 | 1.94 |
| 50-54 | 1,539 | 12,118.4 | 71 | 0.59 | 0.46 | 0.74 |
| >=55 | 104 | 1,035.2 | 10 | 0.97 | 0.43 | 1.71 |

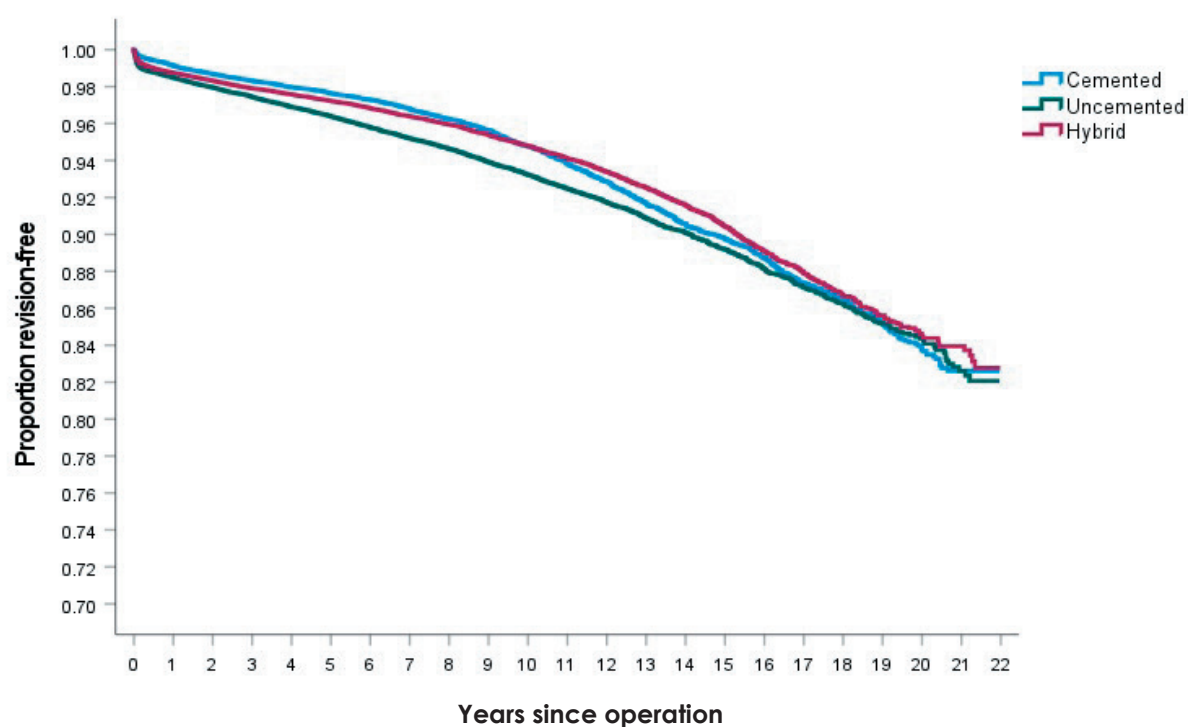


KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 22 years 1999 – 2020 with deceased patients censored at time of death.



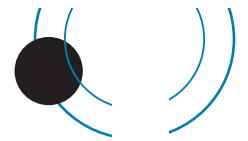
| Years | % Revision-free | No. in each year |
|-------|-----------------|------------------|
| 1 | 98.71 | 140,770 |
| 2 | 98.24 | 129,019 |
| 3 | 97.79 | 117,565 |
| 4 | 97.38 | 106,172 |
| 5 | 96.97 | 95,302 |
| 6 | 96.50 | 84,897 |
| 7 | 95.98 | 74,943 |
| 8 | 95.46 | 65,667 |
| 9 | 94.84 | 57,028 |
| 10 | 94.14 | 49,124 |
| 11 | 93.37 | 41,574 |
| 12 | 92.57 | 34,730 |
| 13 | 91.64 | 28,630 |
| 14 | 90.72 | 23,124 |
| 15 | 89.75 | 18,399 |
| 16 | 88.58 | 14,099 |
| 17 | 87.40 | 10,291 |
| 18 | 86.40 | 7,298 |
| 19 | 85.26 | 4,854 |
| 20 | 84.17 | 2,847 |



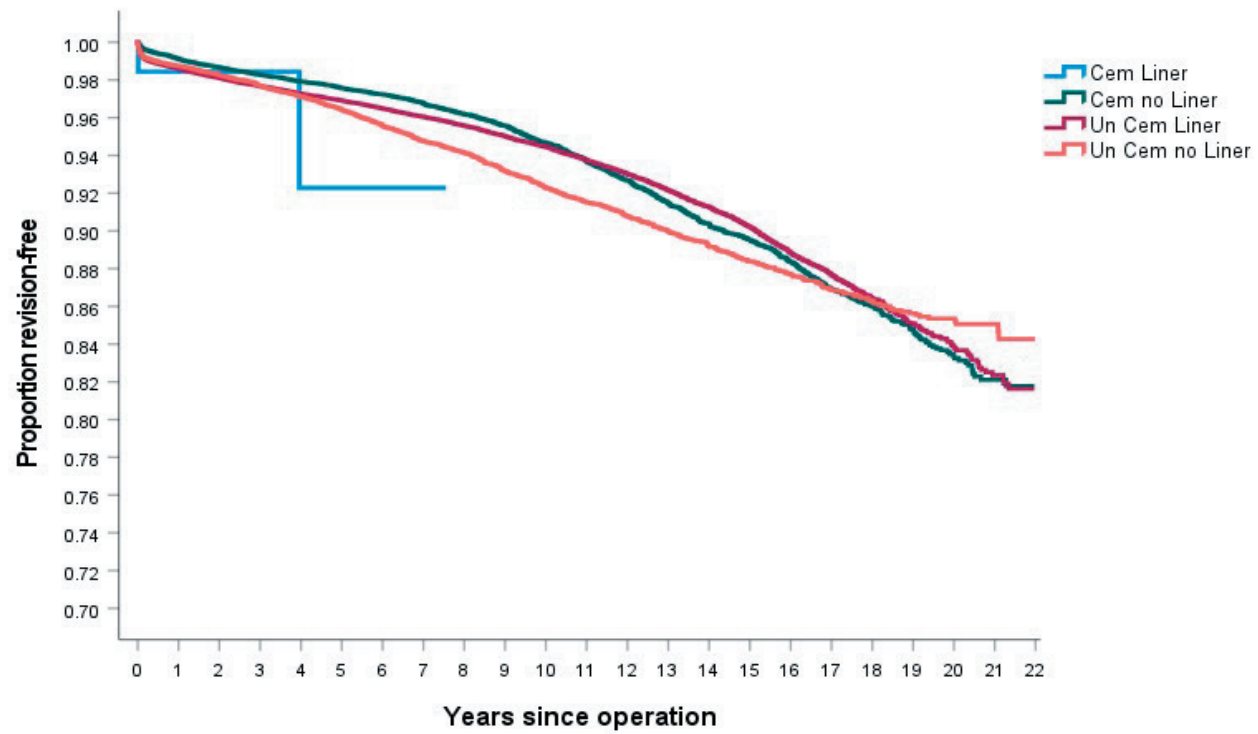
| Cemented | | |
|----------|-----------------|------------------|
| Years | % Revision-free | No. in each year |
| 1 | 99.14 | 26,576 |
| 2 | 98.69 | 25,135 |
| 3 | 98.32 | 23,632 |
| 4 | 97.97 | 22,044 |
| 5 | 97.64 | 20,370 |
| 6 | 97.30 | 18,553 |
| 7 | 96.79 | 16,715 |
| 8 | 96.24 | 14,908 |
| 9 | 95.65 | 13,154 |
| 10 | 94.77 | 11,508 |
| 11 | 93.84 | 10,048 |
| 12 | 92.85 | 8,682 |
| 13 | 91.69 | 7,338 |
| 14 | 90.59 | 6,102 |
| 15 | 89.78 | 5,004 |
| 16 | 88.72 | 3,928 |
| 17 | 87.39 | 2,928 |
| 18 | 86.49 | 2,151 |
| 19 | 85.26 | 1,486 |
| 20 | 83.79 | 885 |

| Uncemented | | |
|------------|-----------------|------------------|
| Years | % Revision-free | No. in each year |
| 1 | 98.49 | 57,975 |
| 2 | 97.96 | 52,750 |
| 3 | 97.44 | 47,837 |
| 4 | 96.90 | 42,909 |
| 5 | 96.40 | 38,408 |
| 6 | 95.80 | 34,176 |
| 7 | 95.21 | 30,162 |
| 8 | 94.64 | 26,356 |
| 9 | 93.93 | 22,865 |
| 10 | 93.24 | 19,533 |
| 11 | 92.49 | 16,041 |
| 12 | 91.75 | 12,870 |
| 13 | 90.87 | 10,260 |
| 14 | 90.11 | 8,040 |
| 15 | 89.19 | 6,201 |
| 16 | 88.15 | 4,673 |
| 17 | 87.14 | 3,379 |
| 18 | 86.25 | 2,349 |
| 19 | 85.14 | 1,542 |
| 20 | 84.37 | 901 |

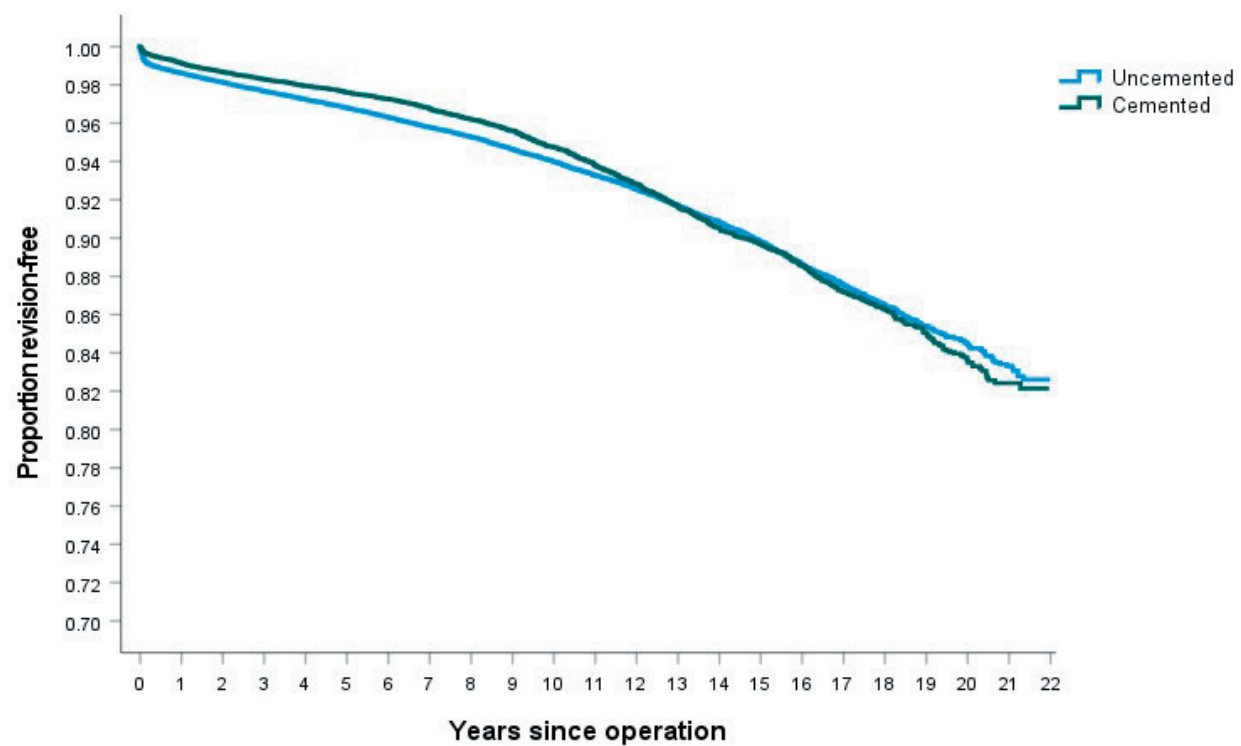
| Hybrid | | |
|--------|-----------------|------------------|
| Years | % Revision-free | No. in each year |
| 1 | 98.75 | 56,219 |
| 2 | 98.33 | 51,134 |
| 3 | 97.91 | 46,096 |
| 4 | 97.59 | 41,219 |
| 5 | 97.23 | 36,524 |
| 6 | 96.84 | 32,168 |
| 7 | 96.39 | 28,066 |
| 8 | 95.95 | 24,403 |
| 9 | 95.40 | 21,009 |
| 10 | 94.79 | 18,083 |
| 11 | 94.12 | 15,485 |
| 12 | 93.39 | 13,178 |
| 13 | 92.54 | 11,032 |
| 14 | 91.60 | 8,982 |
| 15 | 90.45 | 7,194 |
| 16 | 89.11 | 5,498 |
| 17 | 87.89 | 3,984 |
| 18 | 86.71 | 2,798 |
| 19 | 85.61 | 1,826 |
| 20 | 84.55 | 1,061 |



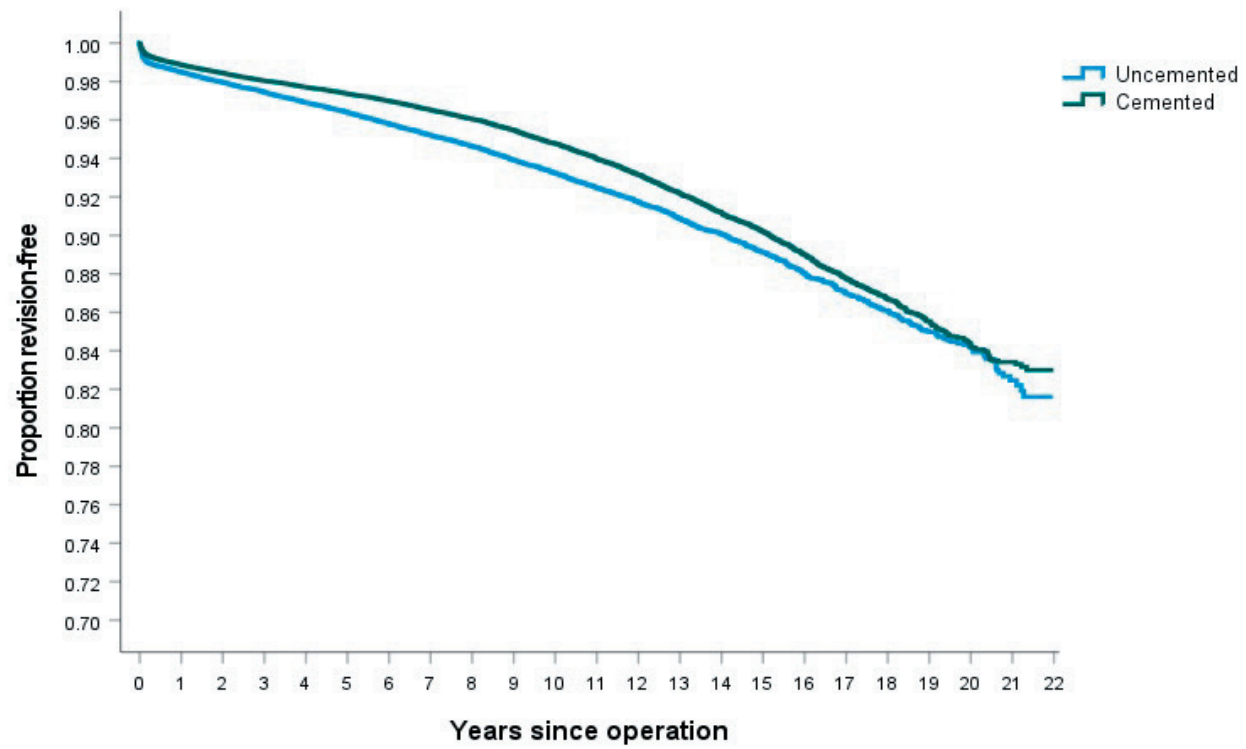
Survival of Cemented vs Uncemented no Liner vs Uncemented with Liner



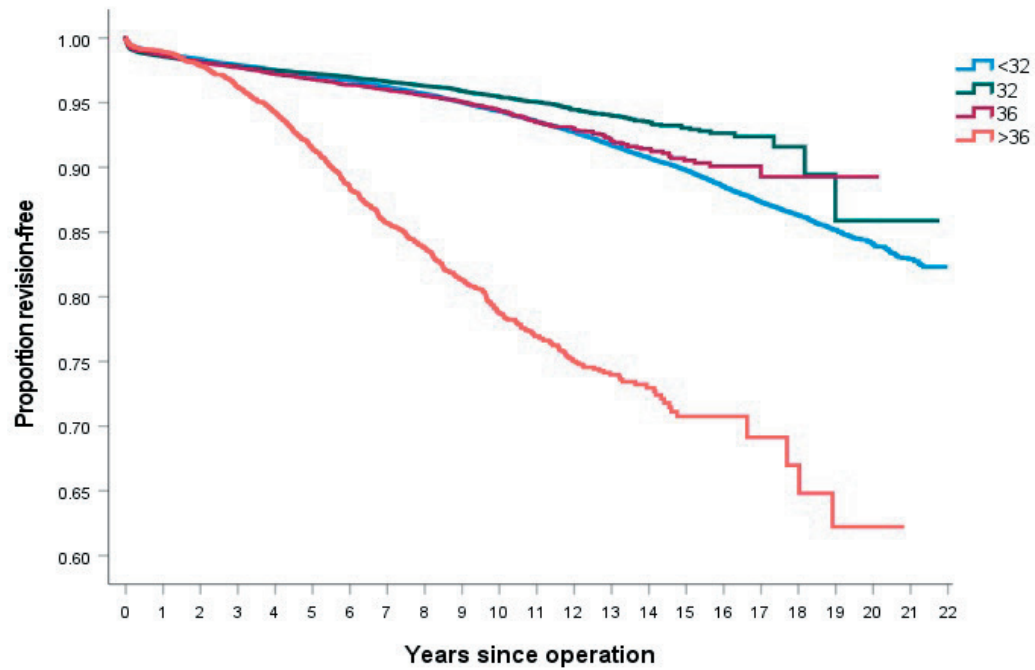
Survival of Cemented vs Uncemented Acetabulae

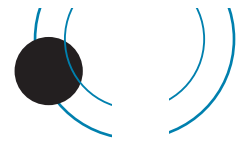


Survival of Cemented vs Uncemented Femoral components

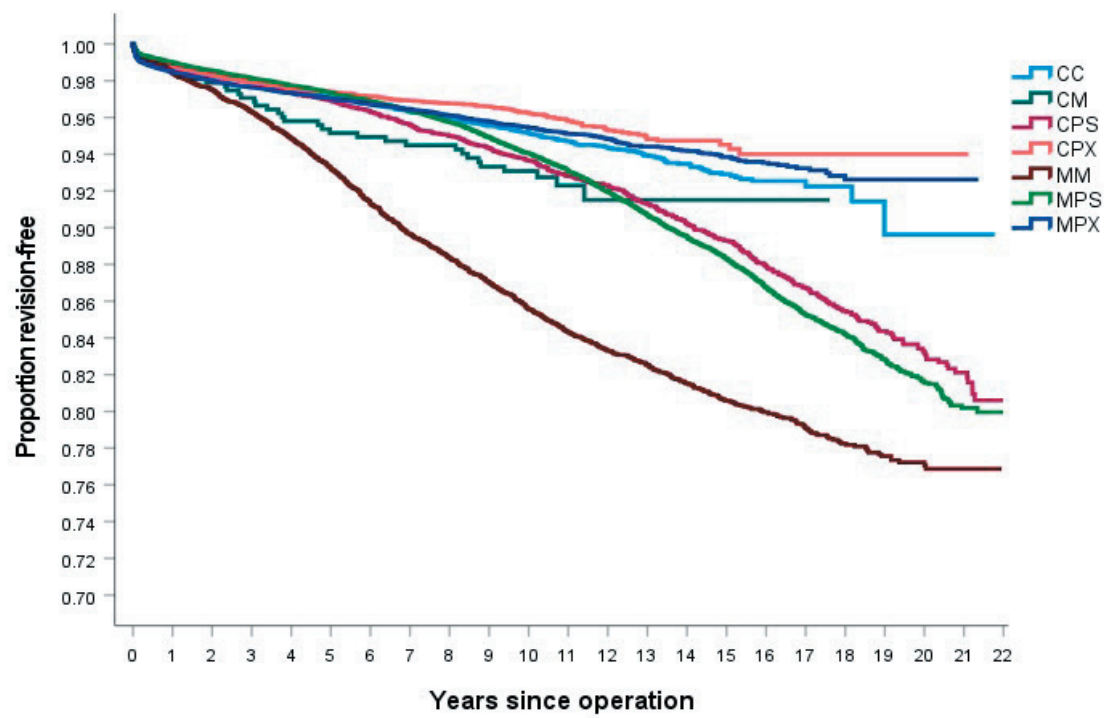


Survival of Head Sizes

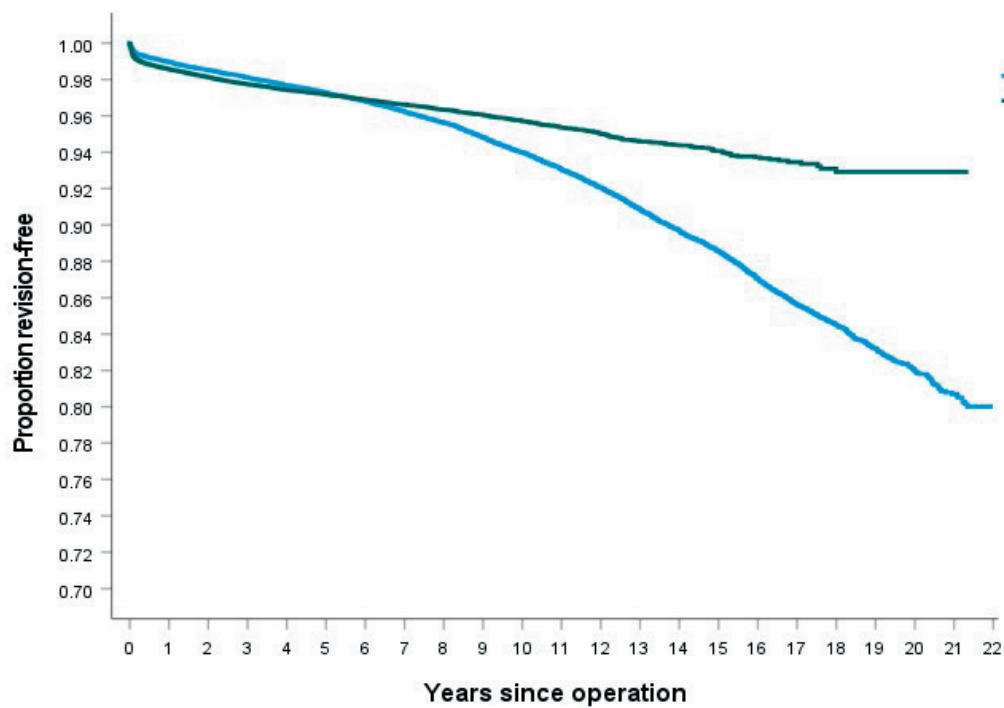




Survival of Bearing Surfaces

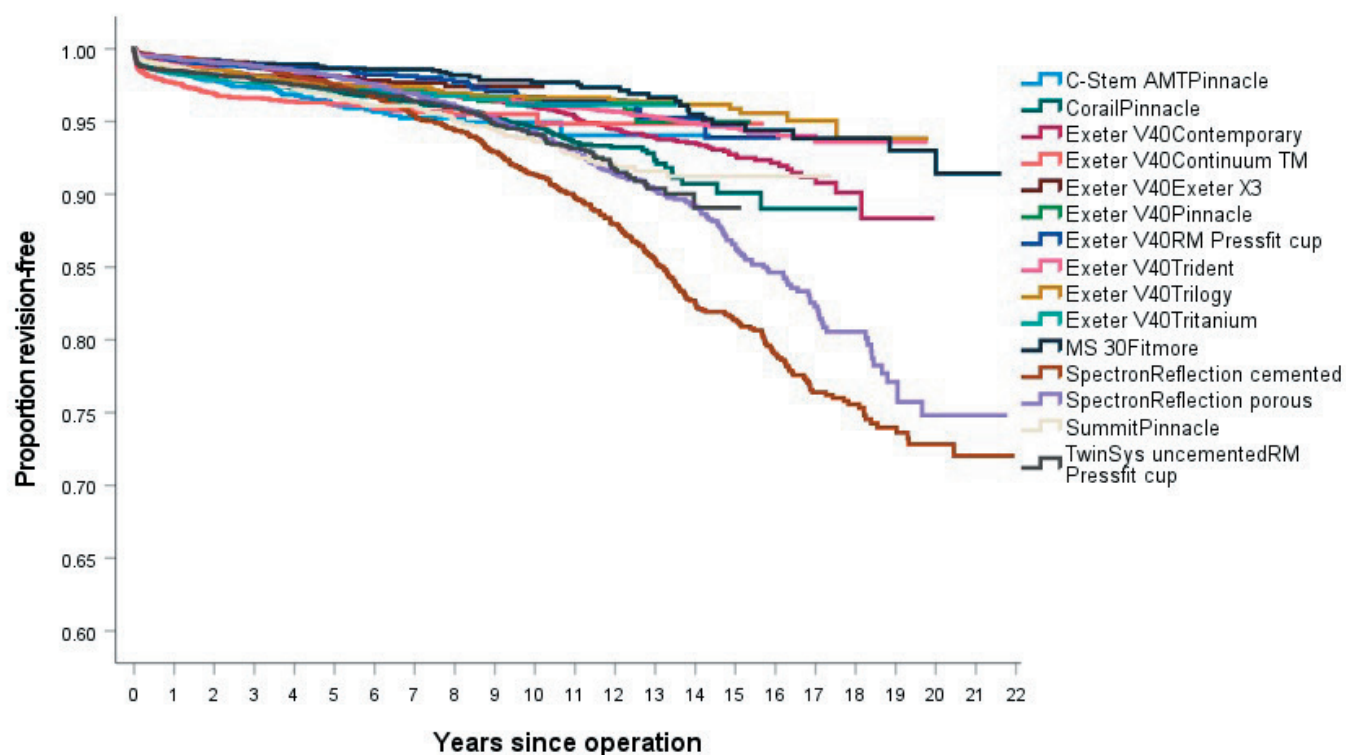


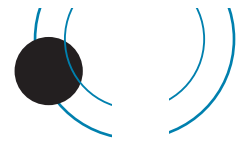
Survival of Crosslinked vs Standard polyethylene





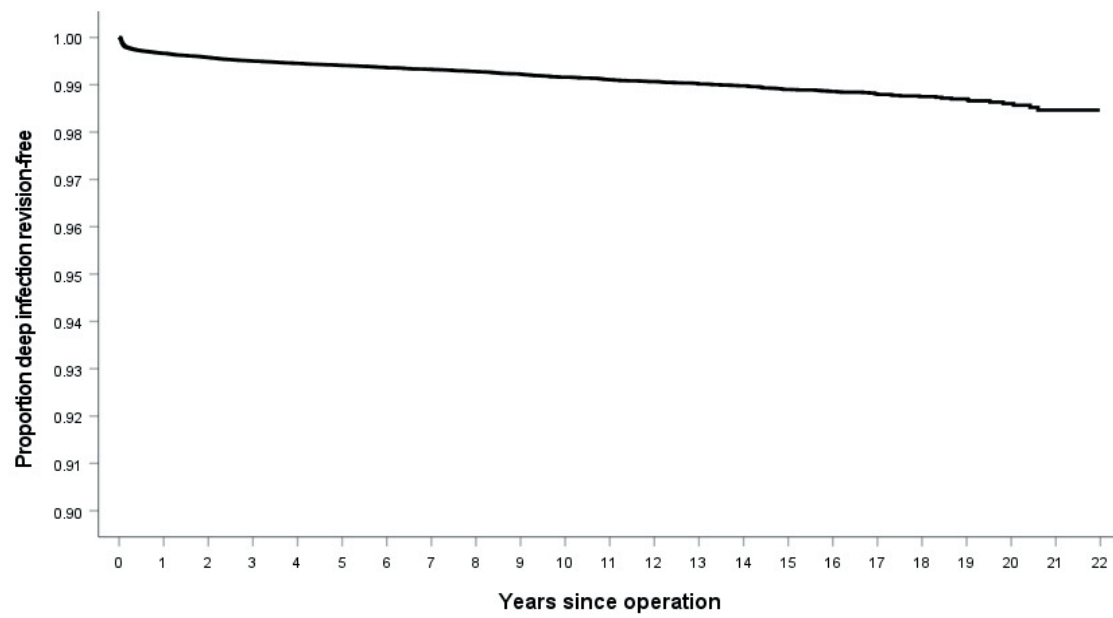
Survival of combinations with > 2500 procedures



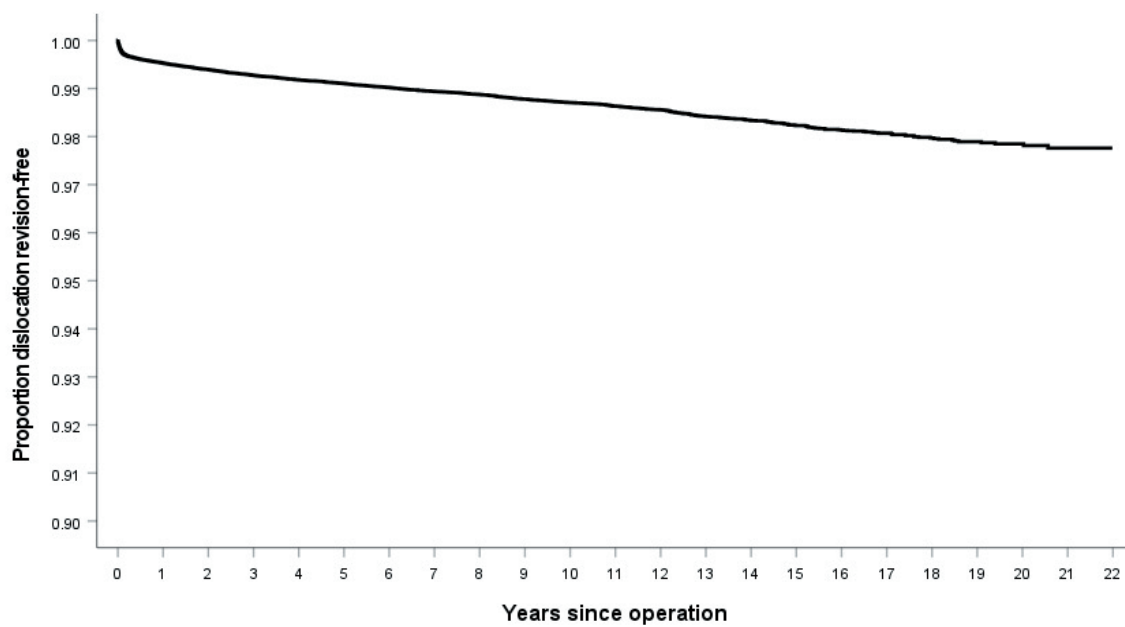


The following K M graphs are for the six main individual reasons for revision:

Deep infection

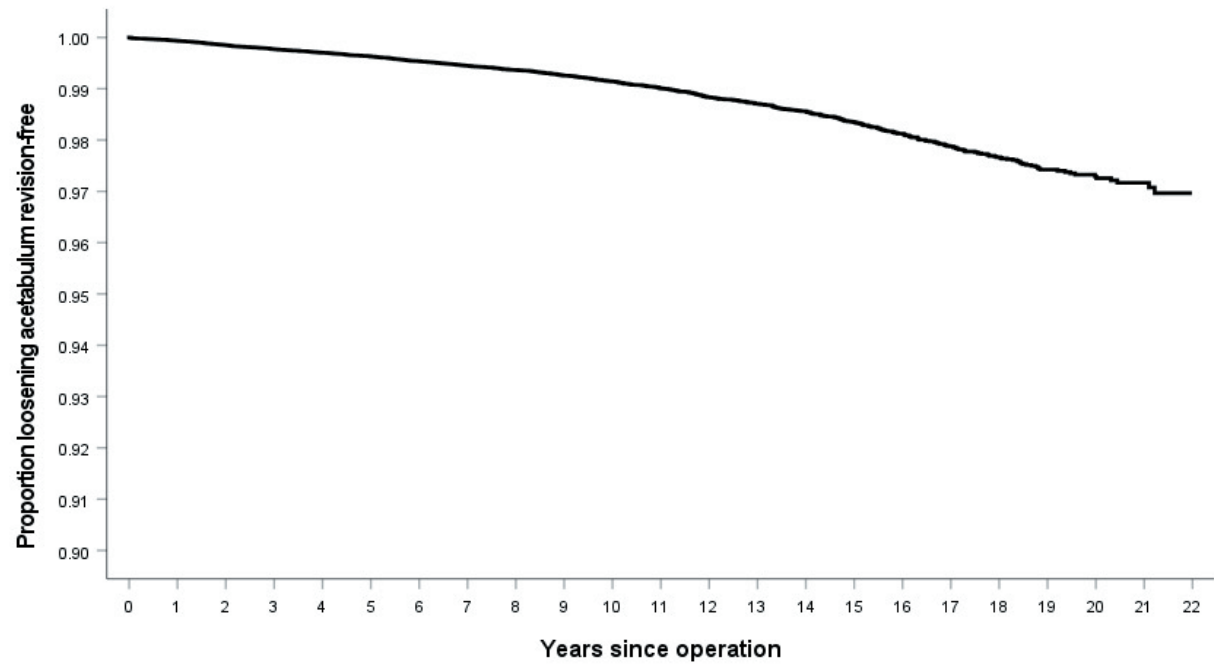


Dislocation

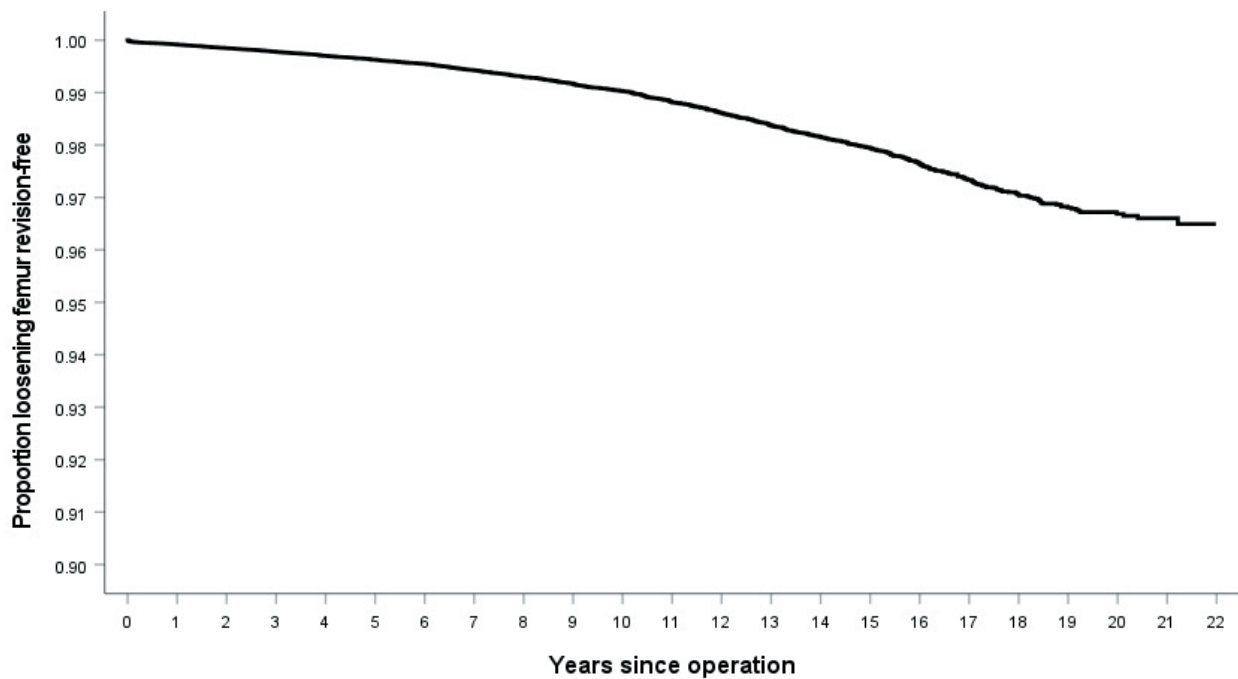


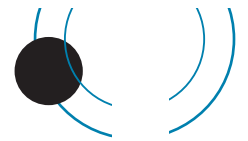


Loosening acetabular component

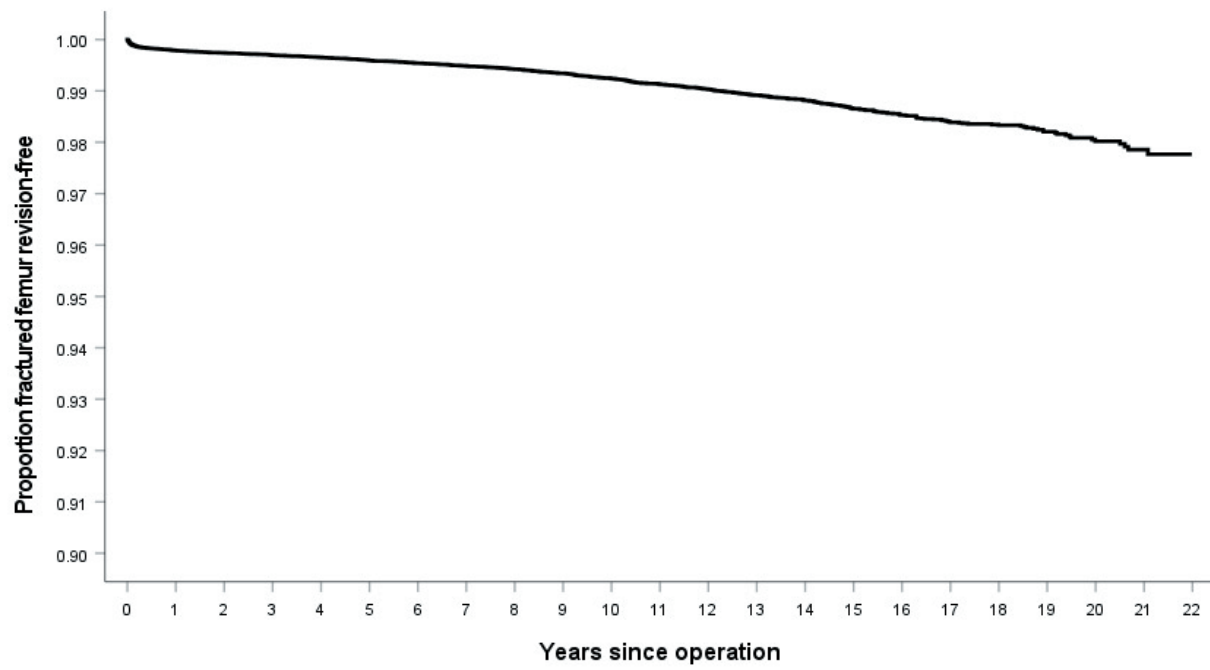


Loosening femoral component

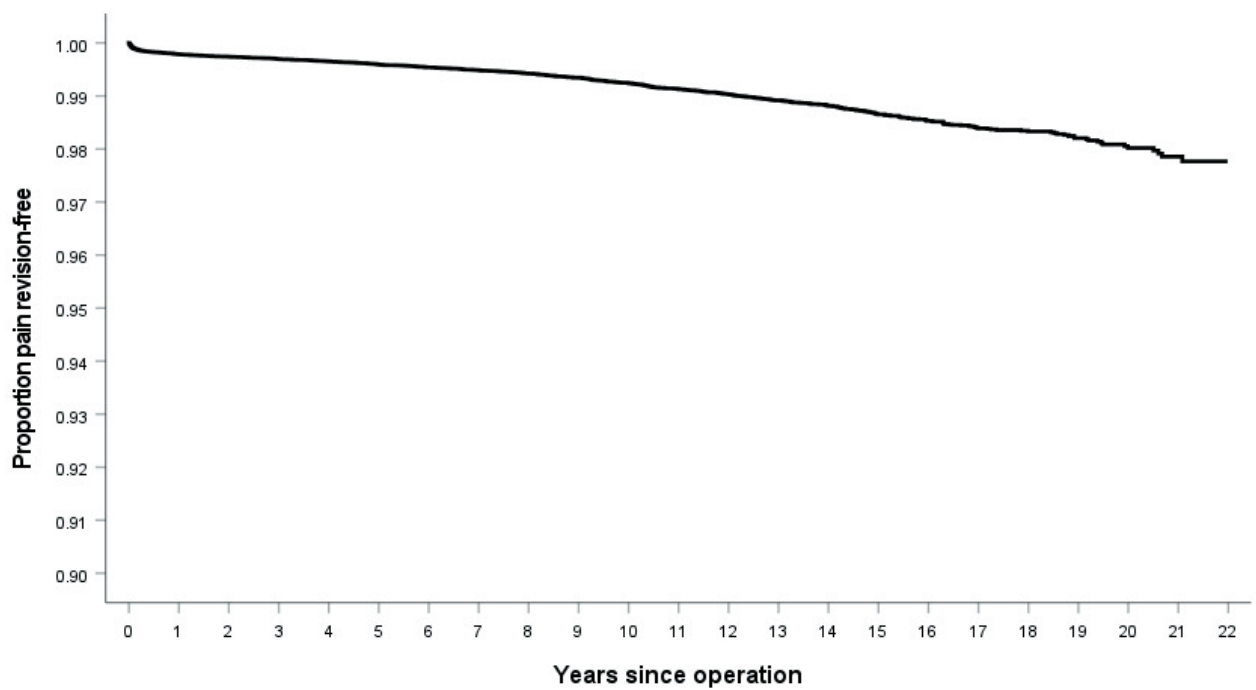




Fracture femur

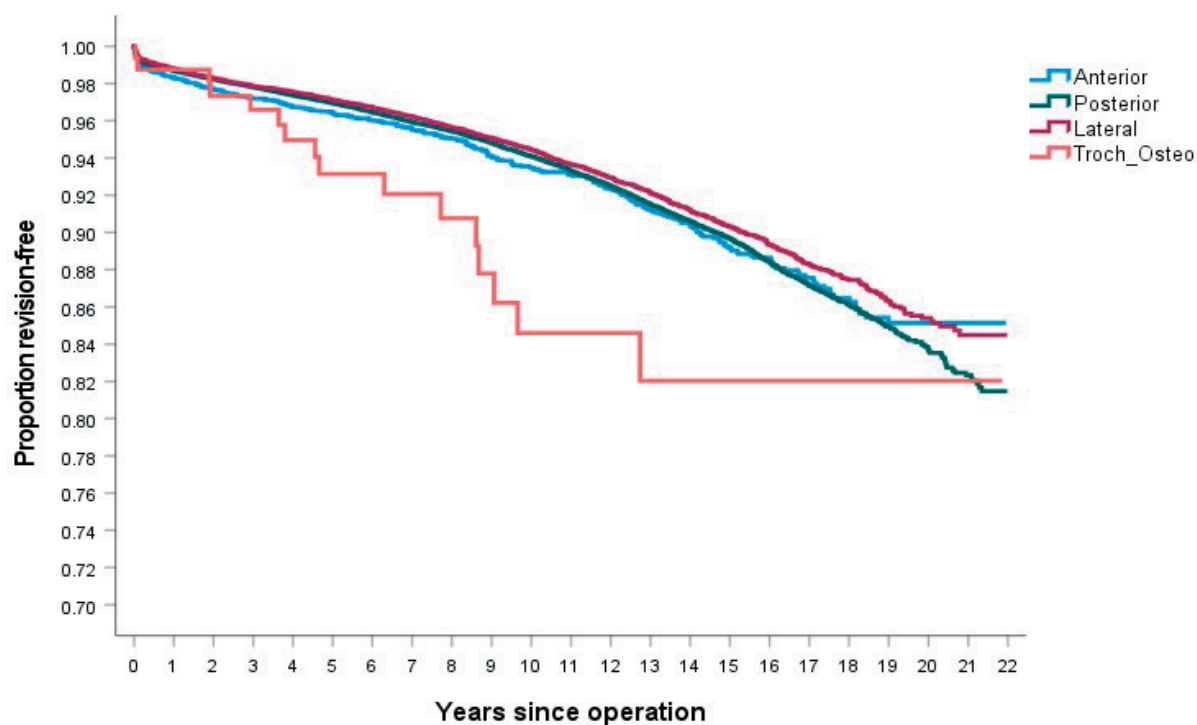


Pain

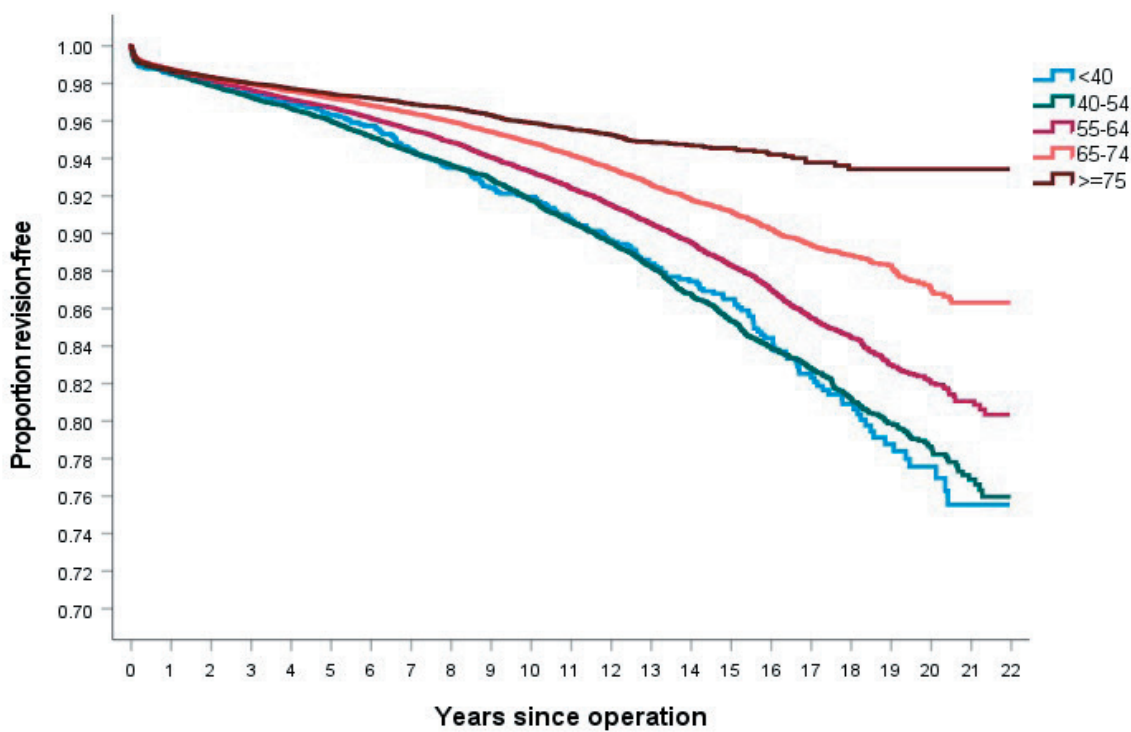


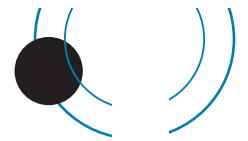


Survival for surgical approach

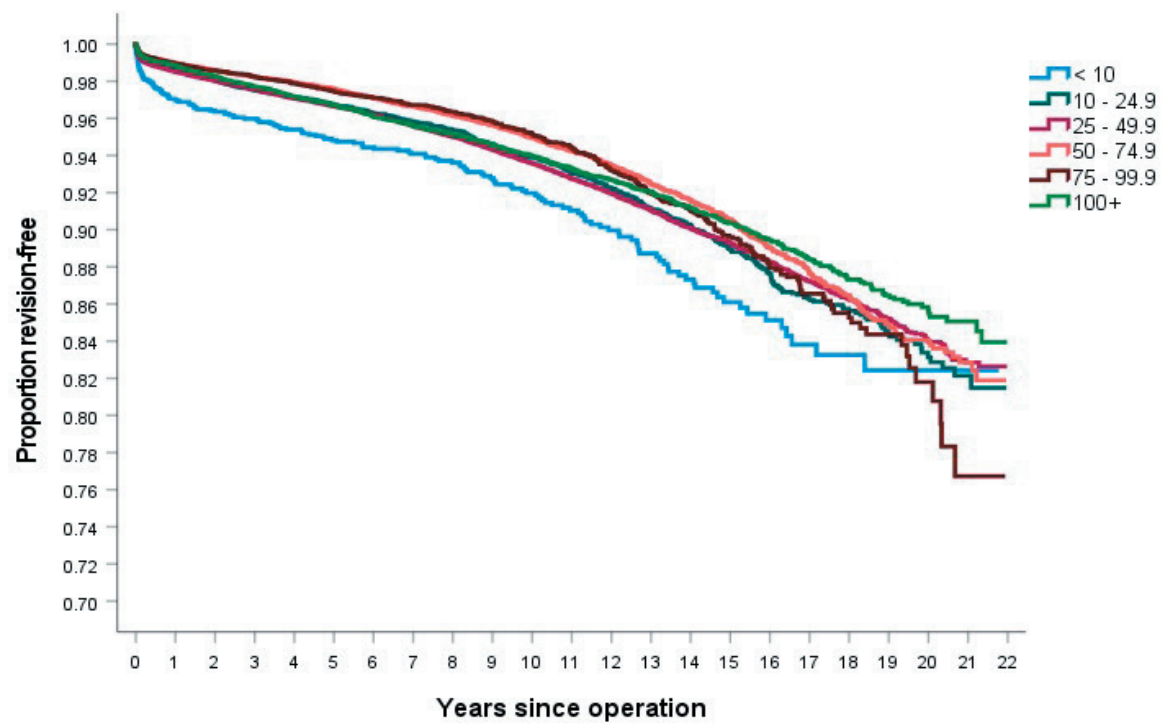


Survival for age bands

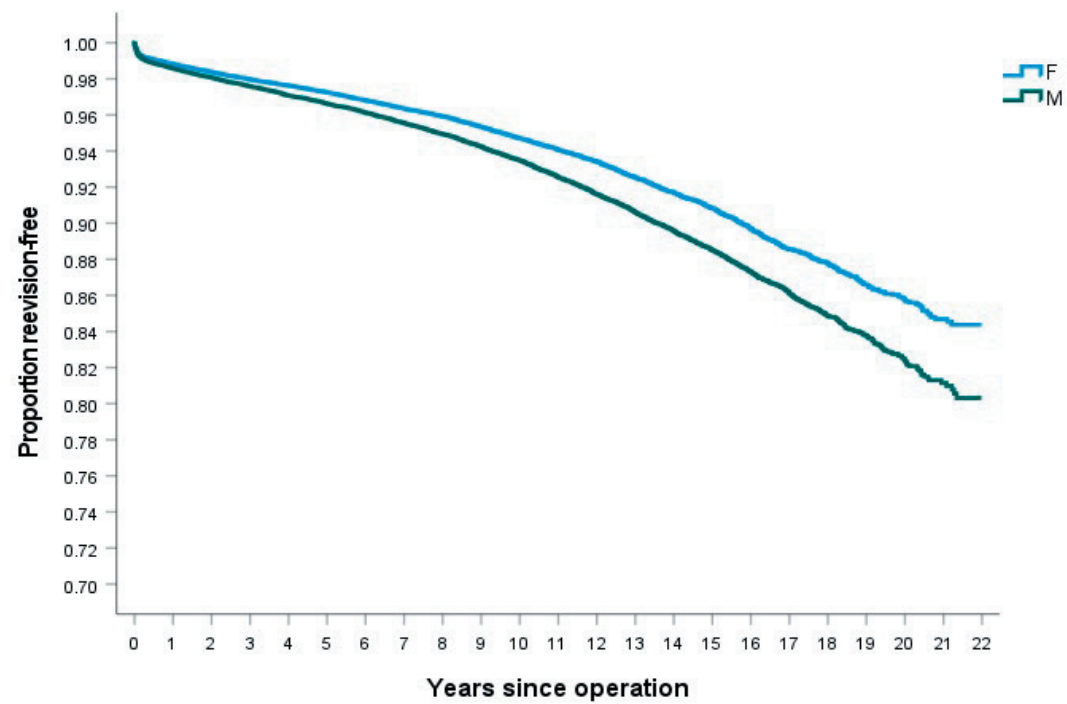




Survival for surgeon annual output

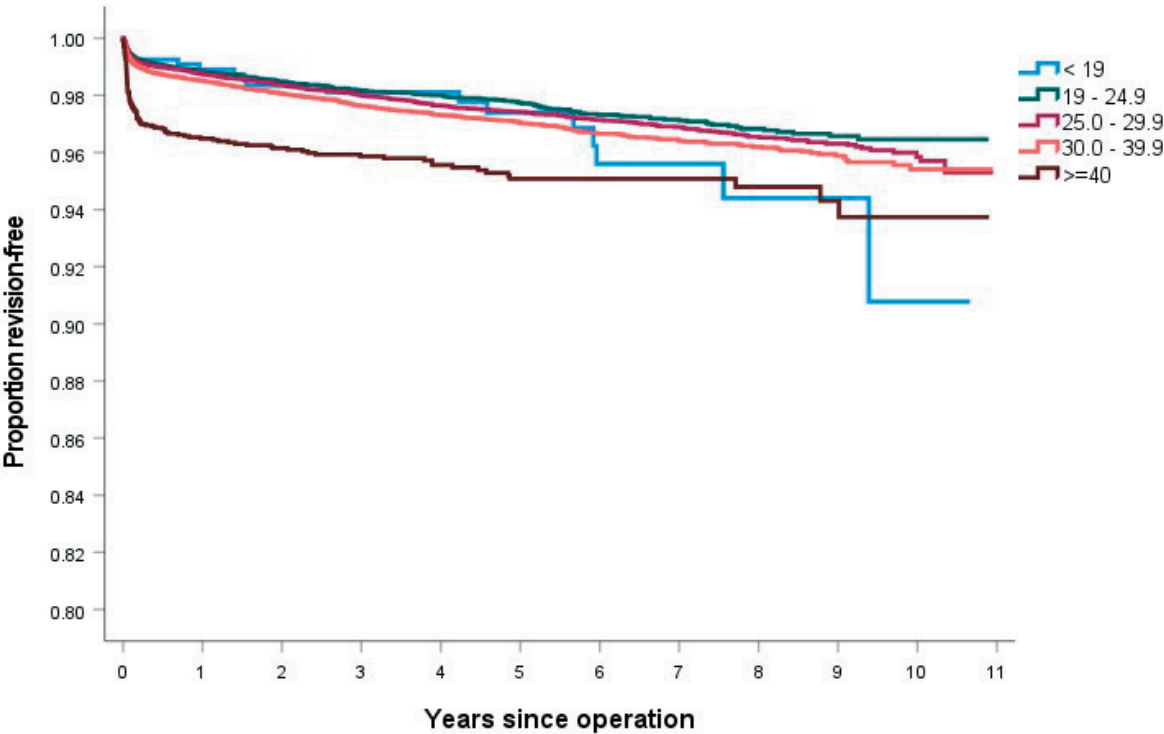


Survival male vs female





Survival vs BMI



Re-revisions of total hips

Analyses were undertaken of hip re-revisions.

There were 1,254 registered total hip replacements that had been revised twice, 301 that had been revised three times, 87 that had been revised four times, 28 that had been revised 5 times and 9 that had been revised 6 times.

Second revision

Time between the first and second revisions averaged 903 days (2.47 years) with a range of 0 – 6,601 and a standard deviation of 1,198.

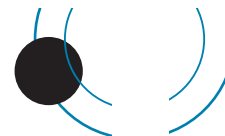
This compares to an average of 2,256 days (6.2 years) between the primary and first revision.

Reason for revision

| | |
|--------------------------------|-----|
| Deep infection | 401 |
| Dislocation/instability | 335 |
| Loosening femoral component | 156 |
| Loosening acetabulum component | 148 |
| Unexplained pain | 114 |
| Fracture femur | 96 |
| Poly wear | 1 |

Procedure performed

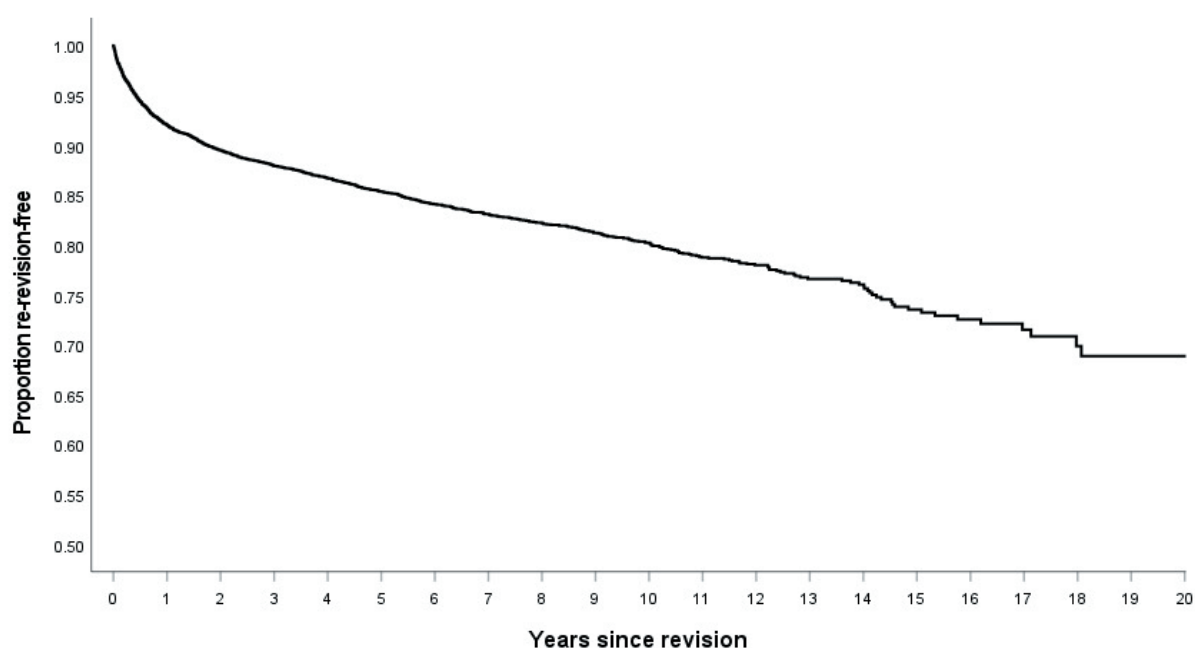
| | |
|-----------------------------|-----|
| Change of all | 350 |
| Change of femoral component | 344 |
| Change of acetabular shell | 329 |
| Change of liner | 575 |
| Change of head | 83 |



Re-revisions

| No. Ops. | Observed component years | Number Revised | Rate/100-component-years | Exact 95% confidence interval | |
|----------|--------------------------|----------------|--------------------------|-------------------------------|------|
| 8,231 | 44,255.7 | 1,254 | 2.83 | 2.68 | 2.99 |

| Years | Percentage re-revision free | No. in each year |
|-------|-----------------------------|------------------|
| 1 | 92.03 | 6,848 |
| 2 | 89.50 | 5,920 |
| 3 | 87.92 | 5,168 |
| 4 | 86.71 | 4,461 |
| 5 | 85.36 | 3,827 |
| 6 | 84.10 | 3,182 |
| 7 | 83.09 | 2,664 |
| 8 | 82.21 | 2,136 |
| 9 | 81.19 | 1,685 |
| 10 | 80.21 | 1,282 |
| 11 | 78.74 | 968 |
| 12 | 77.97 | 734 |
| 13 | 76.59 | 516 |
| 14 | 76.03 | 375 |
| 15 | 73.52 | 260 |
| 16 | 72.53 | 179 |
| 17 | 71.49 | 118 |



Third revision

There were 301 registered.

Fourth revision

There were 87 registered.

Fifth revision

There were 28 registered.

Sixth revision

There were 9 registered.

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

Re- revisions of resurfacing hip replacements

There have been 37 re-revisions.

New form data has the revision/reoperation procedures combined on the same form.

This analysis is for the revision/reoperation hip form.

Re-operation index 1

N = 7

If Re-operation only

| | |
|---------------------------------------|---|
| Debridement/Lavage for deep infection | 2 |
| Closed reduction of dislocation | - |
| Open reduction of dislocation | - |
| Haematoma evacuation | - |
| Superficial wound procedure | - |
| Bone grafting lytic lesion only | - |
| ORIF of periprosthetic fracture | 4 |
| Other- removal / procedure abandoned | 1 |

Approach

| | |
|---------------------------------|---|
| Posterior | 4 |
| Anterior | - |
| Lateral | 2 |
| Trans-trochanteric (osteotomy) | - |

Surgical adjuncts

| | |
|---------------------|---|
| Computer navigation | - |
| Robotic assisted | - |

Operating Theatre

| | |
|--------------|---|
| Conventional | 5 |
| Laminar flow | 1 |

Surgeon Attire

| | |
|------------------------|---|
| Space suits/Helmet fan | 1 |
| One piece toga | - |
| Sterile Hood and Gown | 1 |
| Conventional gown | 6 |

Re-operation index 2

N = 1

If Re-operation only

| | |
|---------------------------------------|---|
| Debridement/Lavage for deep infection | 1 |
| Closed reduction of dislocation | - |
| Open reduction of dislocation | - |
| Haematoma evacuation | 1 |
| Superficial wound procedure | - |
| Bone grafting lytic lesion only | - |
| ORIF of periprosthetic fracture | 1 |

Approach

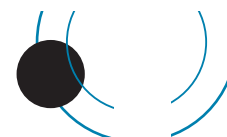
| | |
|-----------|---|
| Posterior | - |
| Anterior | - |
| Lateral | 1 |

Operating theatre

| | |
|--------------|---|
| Conventional | 1 |
| Laminar Flow | - |

Surgeon Attire

| | |
|------------------------|---|
| Space suits/Helmet fan | - |
| One piece toga | - |
| Sterile Hood and Gown | 1 |
| Conventional gown | - |



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- two year period, and as at July 2021, there were 34,982 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 | 19,604 |
| Scoring | 34 – 41 | 9,685 |
| Scoring | 27 – 33 | 3,386 |
| Scoring | < 27 | 2,307 |

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 13,244 individual patients.

At five years post-surgery, 89% of these patients achieved an excellent or good score and had an average of 42.37.

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 9,425 individual patients.

At ten years post-surgery, 87% of these patients achieved an excellent or good score and had an average of 41.94.

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 3,802 individual patients.

At fifteen years post-surgery, 86% of these patients achieved an excellent or good score and had an average of 41.37.

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 1,211 individual patients.

At twenty years post-surgery, 82% of these patients achieved an excellent or good score and had an average of 40.75.

Oxford Scores (at 6 m) vs BMI Status

| BMI | Mean | Standard Error of Mean | Number/ group |
|--------------|--------------|------------------------|---------------|
| < 19 | 39.07 | 0.867 | 92 |
| 19 - 24 | 40.89 | 0.152 | 2,225 |
| 25 - 29 | 40.62 | 0.116 | 3,826 |
| 30 - 39 | 39.25 | 0.136 | 3,207 |
| 40+ | 37.17 | 0.507 | 299 |
| Total | 40.11 | 0.076 | 9,649 |

Revision hip questionnaire responses

There were 11,230 revision hip responses. This group includes all revision hip procedures including revisions of primary arthroplasties performed prior to 1999. The average revision hip score was 34.94 (standard deviation 9.89, range 48 – 2).

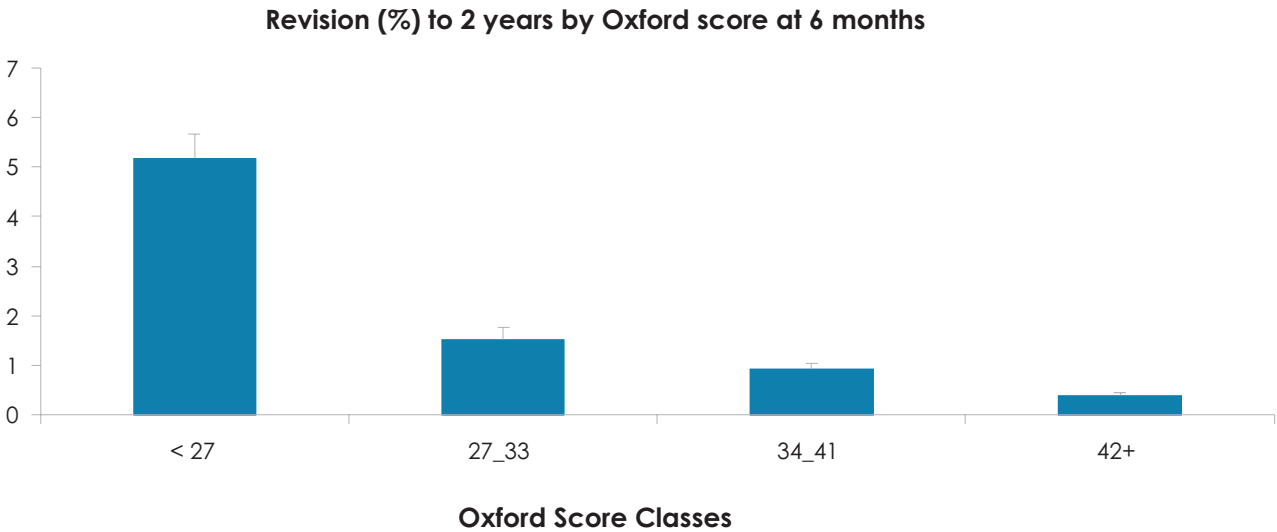


OXFORD 12 SCORE AS A PREDICTOR OF HIP ARTHROPLASTY REVISION

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

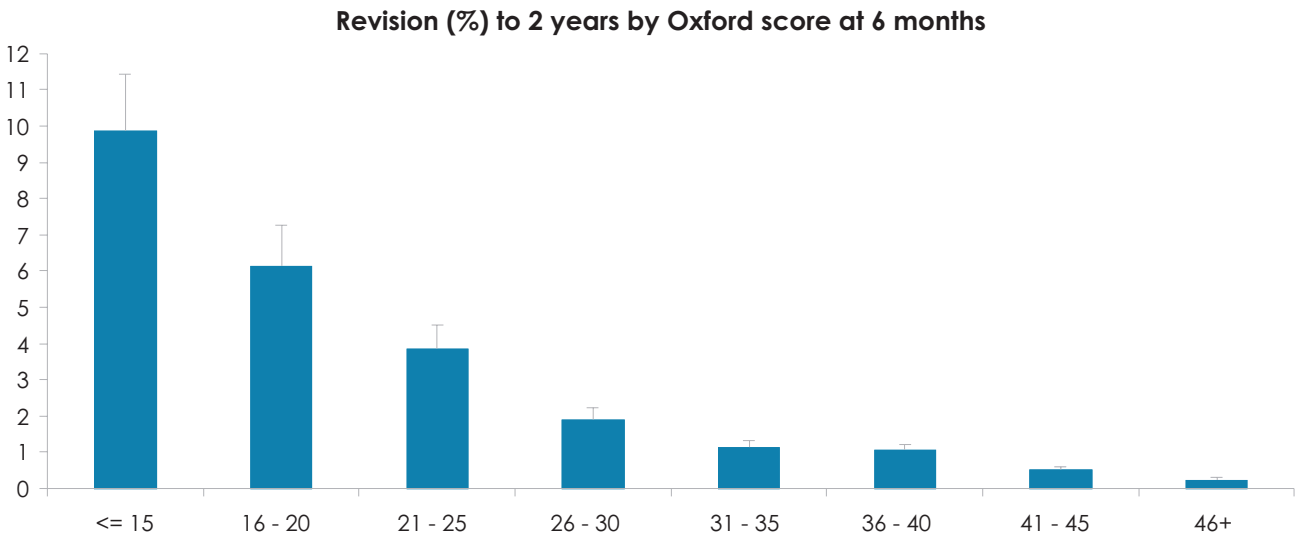
By plotting the patients' six month scores in the Kalairajah groupings against the proportion of hips revised for that same group it demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 13 times the risk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



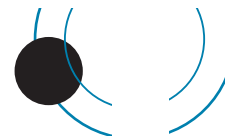
Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date.

| Kalairajah Group | Number in Group | Number revised | % | Standard error |
|------------------|-----------------|----------------|------|----------------|
| < 27 | 1,991 | 103 | 5.17 | 0.50 |
| 27_33 | 2,938 | 45 | 1.53 | 0.23 |
| 34_41 | 8,536 | 80 | 0.94 | 0.10 |
| 42+ | 17,358 | 69 | 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.



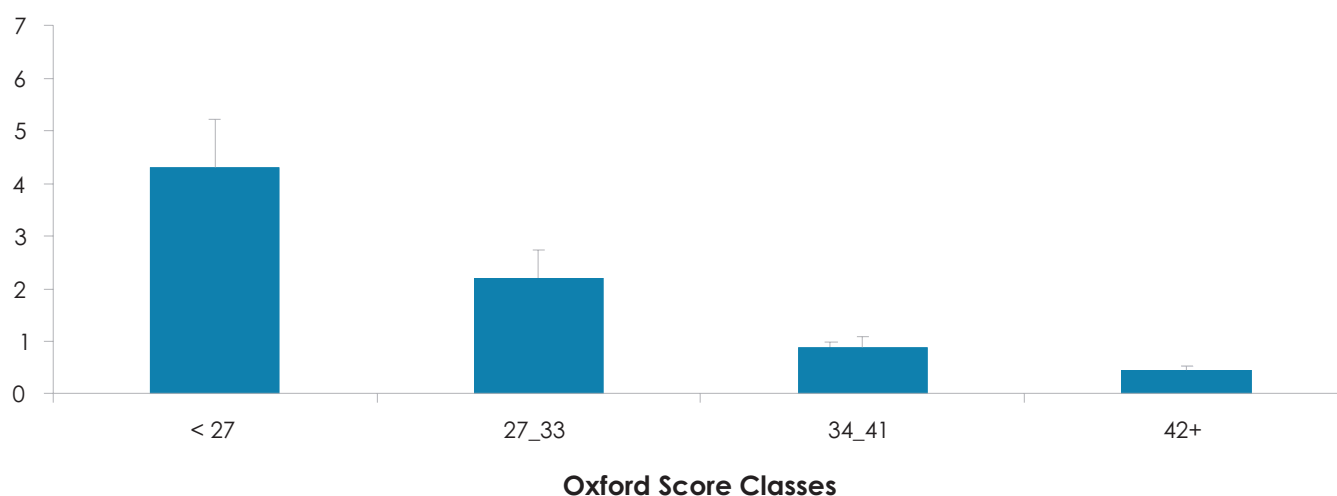
Revision risk versus groupings of Oxford scores within two years of the six month score date.



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

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



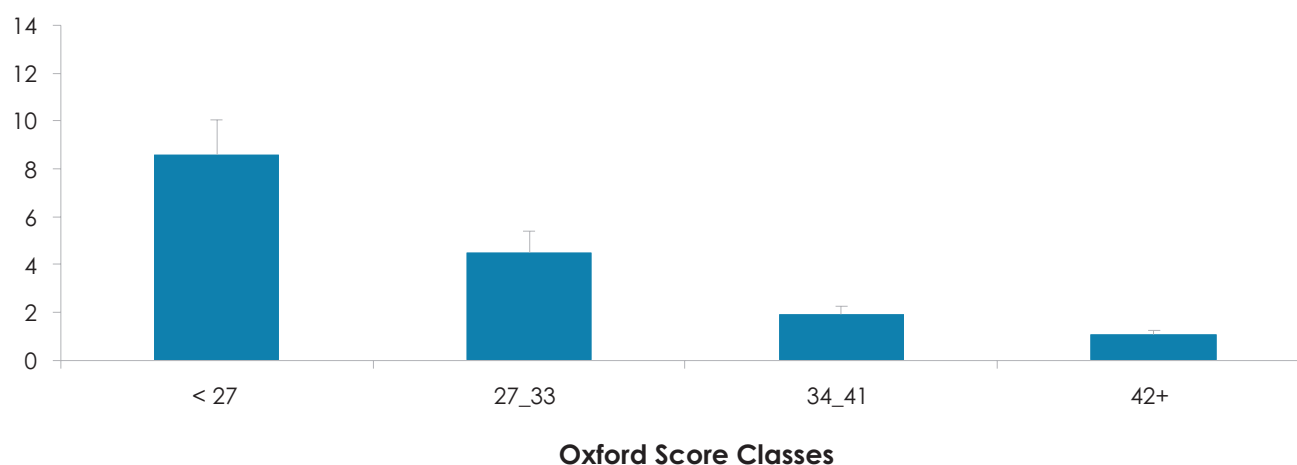
Revision risk versus Kalairajah groupings of Oxford scores within two years of the five year score date.

| Kalairajah Group | Number in Group | Number revised | % | Standard error |
|------------------|-----------------|----------------|------|----------------|
| < 27 | 487 | 21 | 4.31 | 0.92 |
| 27_33 | 730 | 16 | 2.19 | 0.54 |
| 34_41 | 2,150 | 19 | 0.88 | 0.20 |
| 42+ | 7,853 | 36 | 0.46 | 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 (%) to 2 years by Oxford score at 10 years



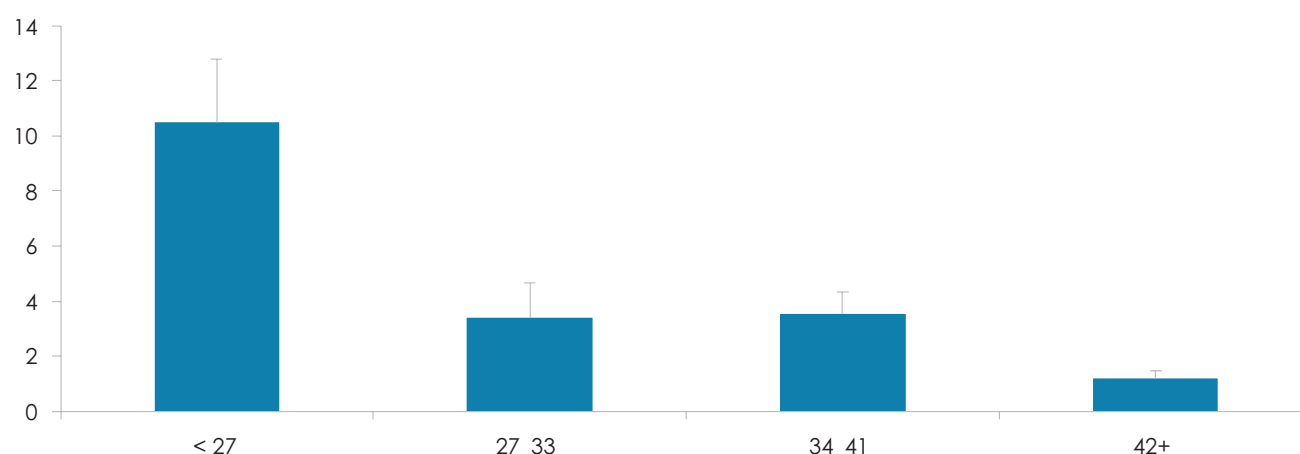
Revision risk versus Kalairajah groupings of Oxford scores within two years of the ten year score date.

| Kalairajah Group | Number in group | Number revised | % | Standard error |
|------------------|-----------------|----------------|------|----------------|
| < 27 | 395 | 34 | 8.61 | 1.41 |
| 27_33 | 532 | 24 | 4.51 | 0.90 |
| 34_41 | 1,457 | 28 | 1.92 | 0.36 |
| 42+ | 4,957 | 55 | 1.11 | 0.15 |

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.

Revision (%) to 2 years by Oxford score at 15 years

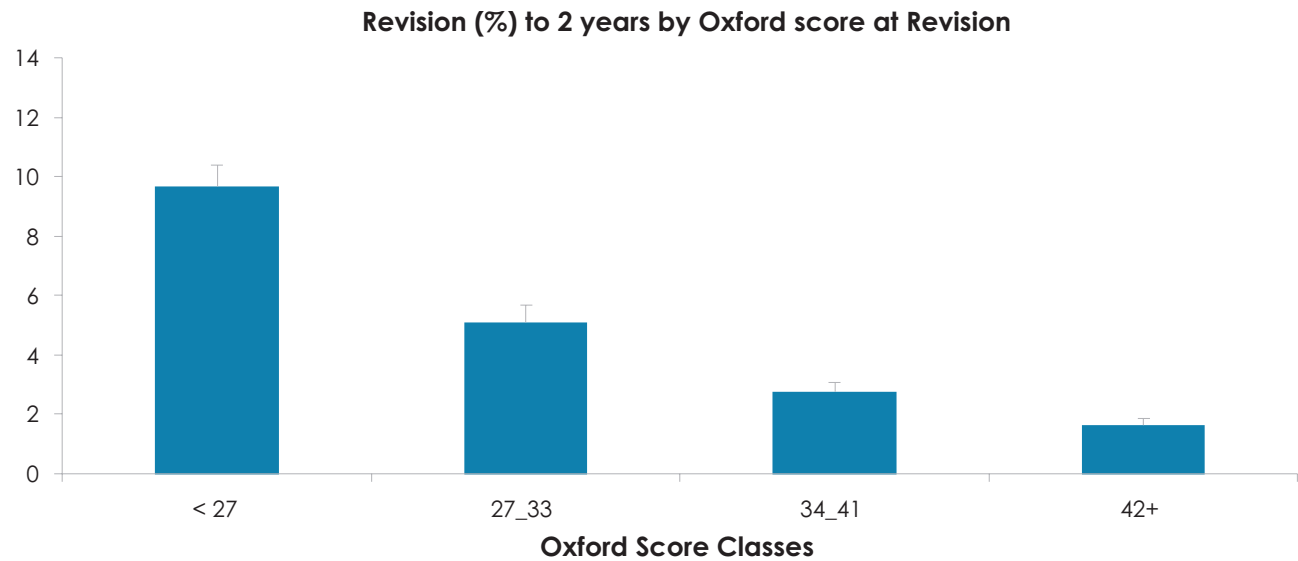
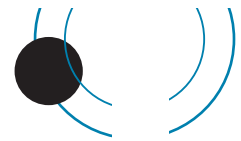


Oxford Score Classes

| Kalairajah Group | Number in group | Number revised | % | Standard error |
|------------------|-----------------|----------------|-------|----------------|
| < 27 | 181 | 19 | 10.50 | 2.28 |
| 27_33 | 206 | 7 | 3.40 | 1.26 |
| 34_41 | 566 | 20 | 3.53 | 0.78 |
| 42+ | 1,849 | 22 | 1.19 | 0.25 |

Prediction of second revision from six month score following first revision

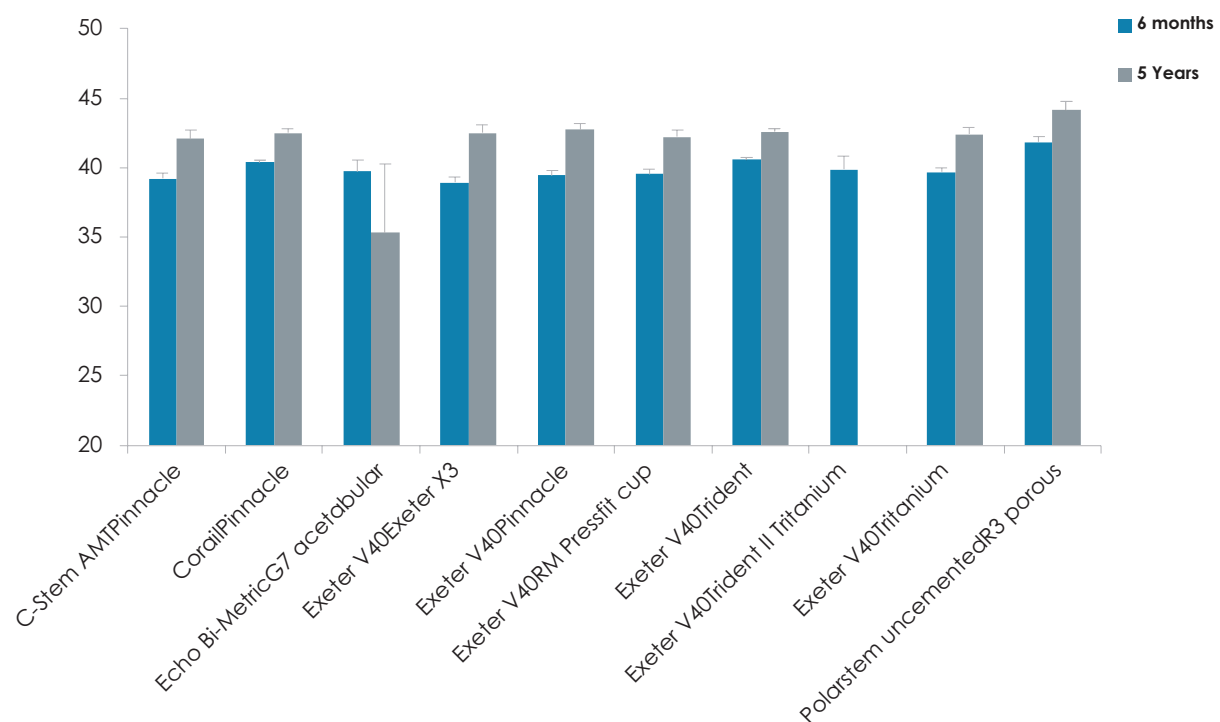
Plotting the patients' six month scores, following their first revision in the Kalairajah groupings, against the proportion of hips revised for that same group, again demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 6 times the risk of a revision within two years compared to a person with a score >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 | 1,596 | 154 | 9.65 | 0.74 |
| 27_33 | 1,513 | 77 | 5.09 | 0.57 |
| 34_41 | 2,776 | 77 | 2.77 | 0.31 |
| 42+ | 2,964 | 48 | 1.62 | 0.23 |

Mean Oxford scores at 6 months and 5 years for 10 hip combinations with > 2000 registrations.



KNEE ARTHROPLASTY

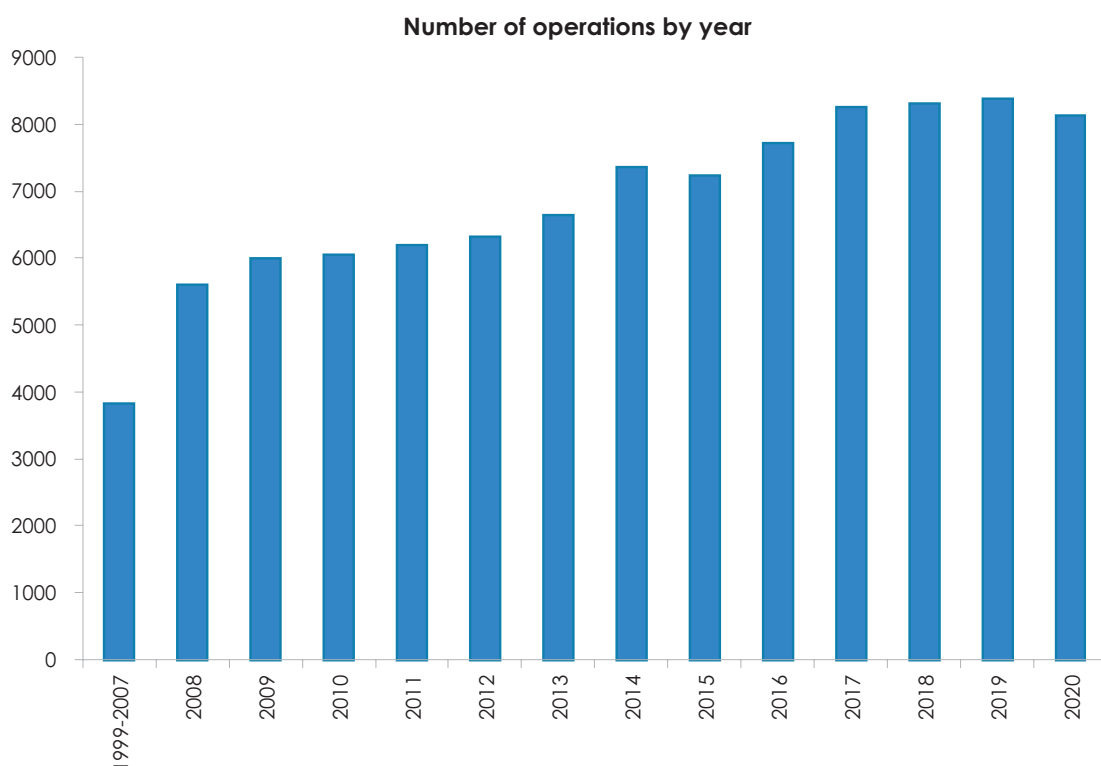
PRIMARY KNEE ARTHROPLASTY

The **twenty-two year** report analyses data for the period January 1999 – December 2020.

New data forms introduced in October 2020 have 3 categories of knee replacement. These are total knees with 126,603 registered, unicompartmental knees with

medial or lateral approach and 14,730 registered and patellofemoral knees with 746 registered.

There are 59 bicompartamental knee replacements (medial unicompartmental plus lateral unicompartmental or patellofemoral replacement) recorded on the Registry.



Data Analysis

All knee arthroplasty

| | Female | Male |
|---------------|--------|--------|
| Number | 65,161 | 61,446 |
| Percentage | 51.46 | 48.54 |
| Mean age | 68.58 | 67.88 |
| Maximum age | 100.49 | 98.68 |
| Minimum age | 10.17 | 8.19 |
| Standard dev. | 8.19 | 9.19 |

Unicompartmental knee arthroplasty

| | Female | Male |
|---------------|--------|-------|
| Number | 6,686 | 8,044 |
| Percentage | 45.39 | 54.61 |
| Mean age | 65.90 | 66.26 |
| Maximum age | 94.71 | 94.55 |
| Minimum age | 18.28 | 30.98 |
| Standard dev. | 10.13 | 9.20 |

Patello-femoral arthroplasty

| | Female | Male |
|---------------|--------|-------|
| Number | 544 | 202 |
| Percentage | 72.92 | 27.08 |
| Mean age | 59.88 | 60.08 |
| Maximum age | 89.39 | 90.72 |
| Minimum age | 31.15 | 31.25 |
| Standard dev. | 11.13 | 10.93 |

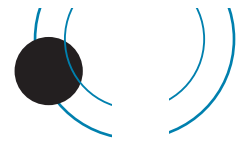
Body Mass Index

For the eleven-year period 2010 - 2020, there were 56,216 BMI registrations for total knee replacements. The average was 31.39 with a range of 15 – 69 and a standard deviation of 6.00.

This data form analysis includes new form and legacy data and is for total knee replacement.

Previous operation

| | |
|-------------------------|---------|
| None | 106,573 |
| Meniscectomy | 12,627 |
| Osteotomy | 1,748 |
| Ligament reconstruction | 1,932 |
| Internal fixation | 999 |
| Synovectomy | 201 |



Diagnosis

| | |
|---|---------|
| Osteoarthritis | 120,299 |
| Rheumatoid arthritis/other inflammatory | 3,442 |
| Post ligament-disruption/reconstruction | 1,226 |
| Post ligament fracture | 1,352 |
| Avascular necrosis | 407 |
| Tumour | 114 |

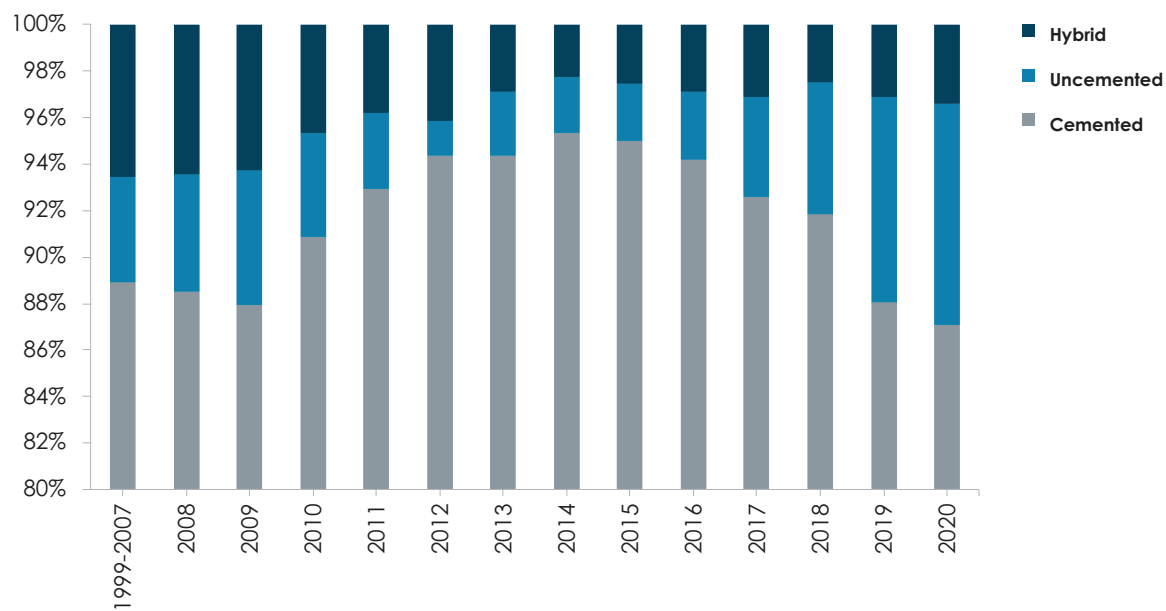
Surgical adjuncts

| | |
|--------------------------------|--------|
| Computer navigation | 18,753 |
| Robotic assisted | 235 |
| Patient specific cutting guide | 12 |

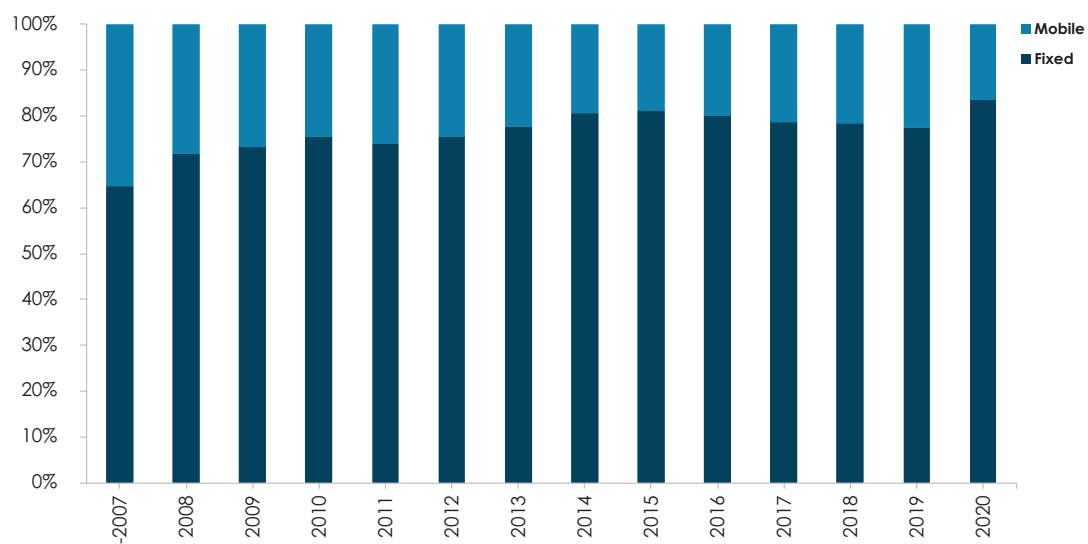
Approach

| | |
|---------------------------|---------|
| Medial parapatellar | 107,452 |
| Lateral parapatellar | 1,539 |
| Tibial tubercle osteotomy | 2 |

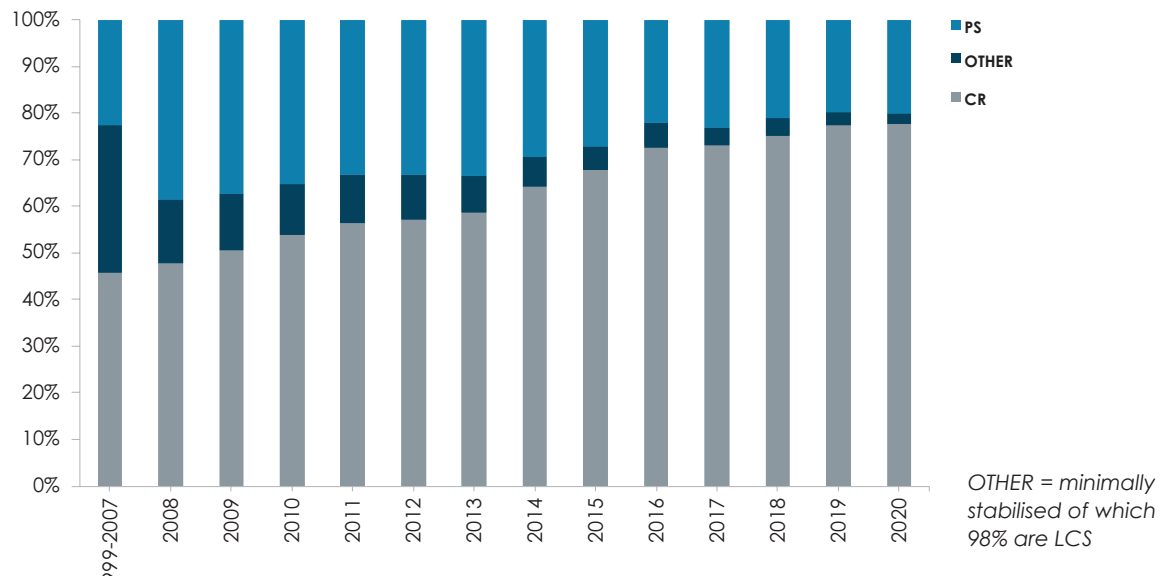
Comparison of proportions of cemented vs uncemented vs hybrid by year



Proportion of fixed vs mobile knees by year



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



Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 120,547 (95%)

Operating theatre

Conventional 68,741
Laminar flow 56,684

Surgeon attire

Space suits/Helmet Fan 43,067
One-piece Toga 155
Sterile Hood and Gown 139

The recent form update now distinguishes between One piece Toga and Sterile Hood and Gown

ASA Class

This was introduced with the updated forms at the beginning of 2005. For the sixteen- year period 2005 – 2020, there were 104,172 (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 | 11,204 | 11 |
| 2 | 66,203 | 63.5 |
| 3 | 26,344 | 25 |
| 4 | 421 | 0.5 |

Operative time (skin to skin in minutes)

Average 83 mins

Surgeon grade

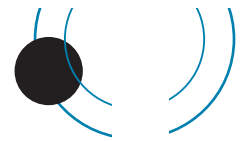
The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the sixteen-year period 2005 – 2020.

Consultant 96,146
Advanced trainee supervised 8,405
Advanced trainee unsupervised 2,043
Basic trainee 1,713

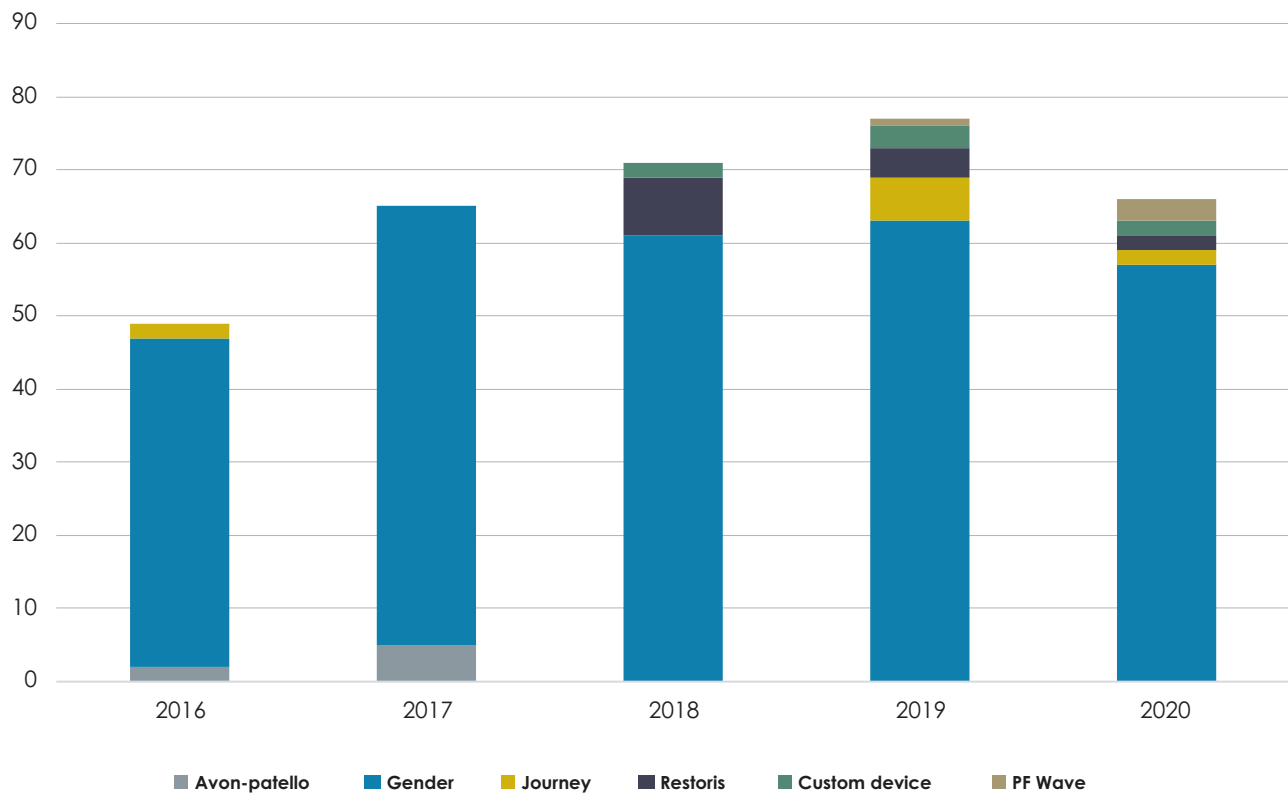
Prosthesis usage

Patello-femoral prostheses used in 2020

| | |
|---------------|----|
| Gender | 57 |
| PF Wave | 3 |
| Restoris Mako | 2 |
| Journey PFJ | 2 |
| Custom device | 2 |



Patello- femoral prostheses used for five years 2016- 2020



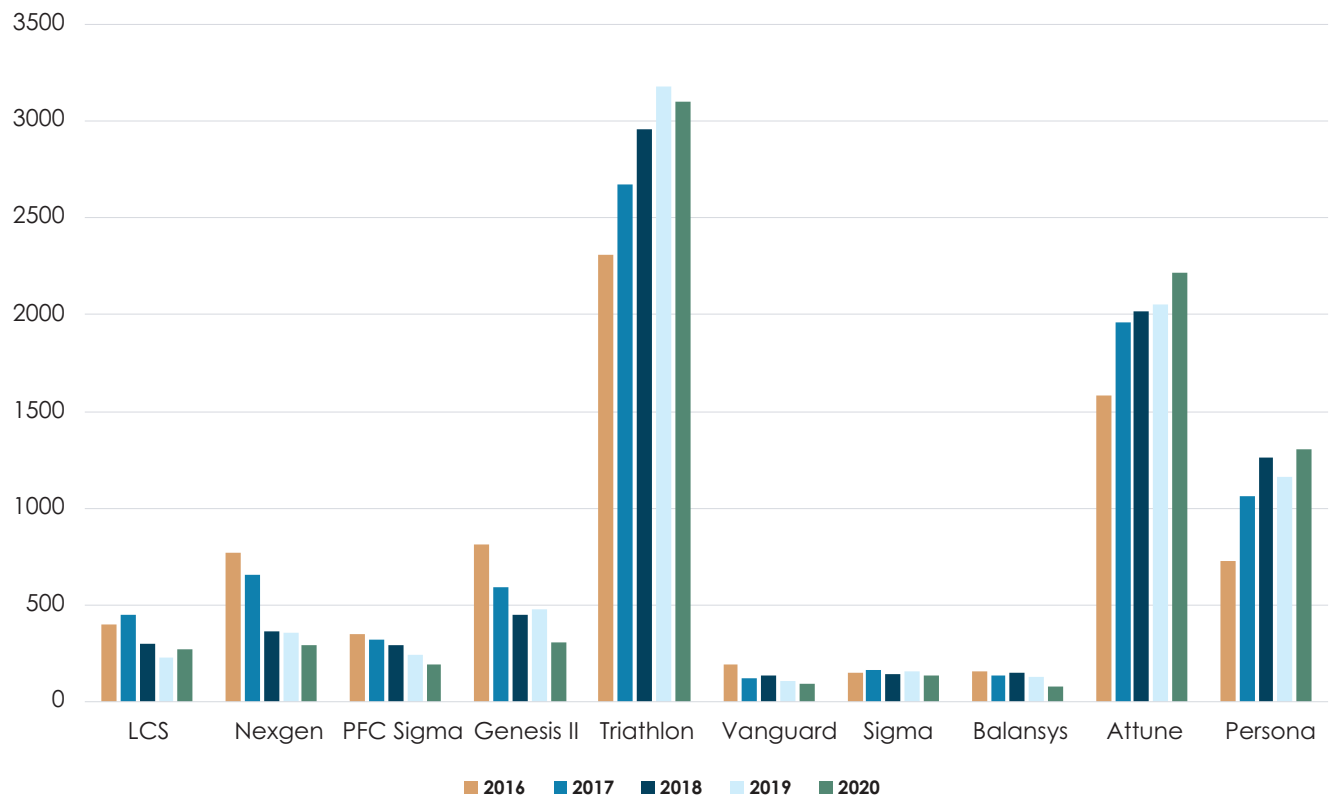
In 2020 there were 66 patello-femoral procedures registered to 29 surgeons.

Total knees

Top ten knee prostheses used in 2020

| | |
|------------|-------|
| Triathlon | 3,101 |
| Attune | 2,217 |
| Persona | 1,307 |
| Genesis II | 310 |
| Nexgen | 293 |
| LCS | 273 |
| PFC Sigma | 193 |
| Sigma | 136 |
| Vanguard | 92 |
| Balansys | 76 |

Most used total knee prostheses per year for five years 2016 – 2020



Surgeon and hospital workload

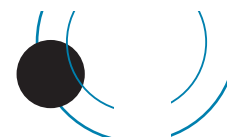
Surgeons

In 2020, 230 surgeons performed 8,135 total knee replacements, an average of 35 procedures per surgeon.

48 surgeons performed less than 10 procedures and 73 performed more than 40.

Hospitals

In 2020 total knee replacement was performed in 51 hospitals. 27 were public hospitals and 24 were private.



REVISION KNEE ARTHROPLASTY

Revision is defined by the Registry as a new operation in a previously replaced knee joint, during which one or more of the components is exchanged, removed, manipulated or added.

Procedures where all components are removed (e.g. Girdlestone, ankle fusion post failed ankle replacement, or removal of components and insertion of a cement spacer for infection) are all recorded as revisions.

Data analysis

For the twenty-two year period January 1999 – December 2020, there were 9,978 revision knee procedures registered. This is an additional 695 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 | 4,705 | 5,273 |
| Percentage | 47.15 | 52.85 |
| Mean age | 69.81 | 69.24 |
| Maximum age | 96.45 | 98.39 |
| Minimum age | 10.57 | 15.00 |
| Standard dev. | 10.22 | 10.04 |

Body Mass Index

For the eleven-year period 2010 - 2020, there were 2,448 BMI registrations for revision knee replacements. The average BMI was 31.42 with a range of 15 – 65 and a standard deviation of 6.11.

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

There were 4,421 revisions of the 126,603 primary total knee replacements, 85 revisions of the 746 patello-femoral knees and 1,245 revisions of the 14,730 unicompartmental knees.

Total knee replacement analysis – this includes new form and legacy reasons for revision

Time to revision – days

| | |
|--------------------|-------------------|
| Average | 1,615 (4.4 years) |
| Maximum | 7,654 |
| Minimum | 1 |
| Standard deviation | 1,545 |

Reason for revision

| | |
|----------------------------------|-------|
| Deep infection | 1,180 |
| Unexplained pain | 1,271 |
| Loosening tibial | 1,053 |
| Loosening femoral | 479 |
| Loosening patellar | 95 |
| Fracture femur | 88 |
| Fracture tibia | 50 |
| Wear in non-replaced compartment | 4 |
| Stiffness/arthrofibrosis | 3 |
| Instability | 2 |
| Poly wear | 1 |

Analysis of the four 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

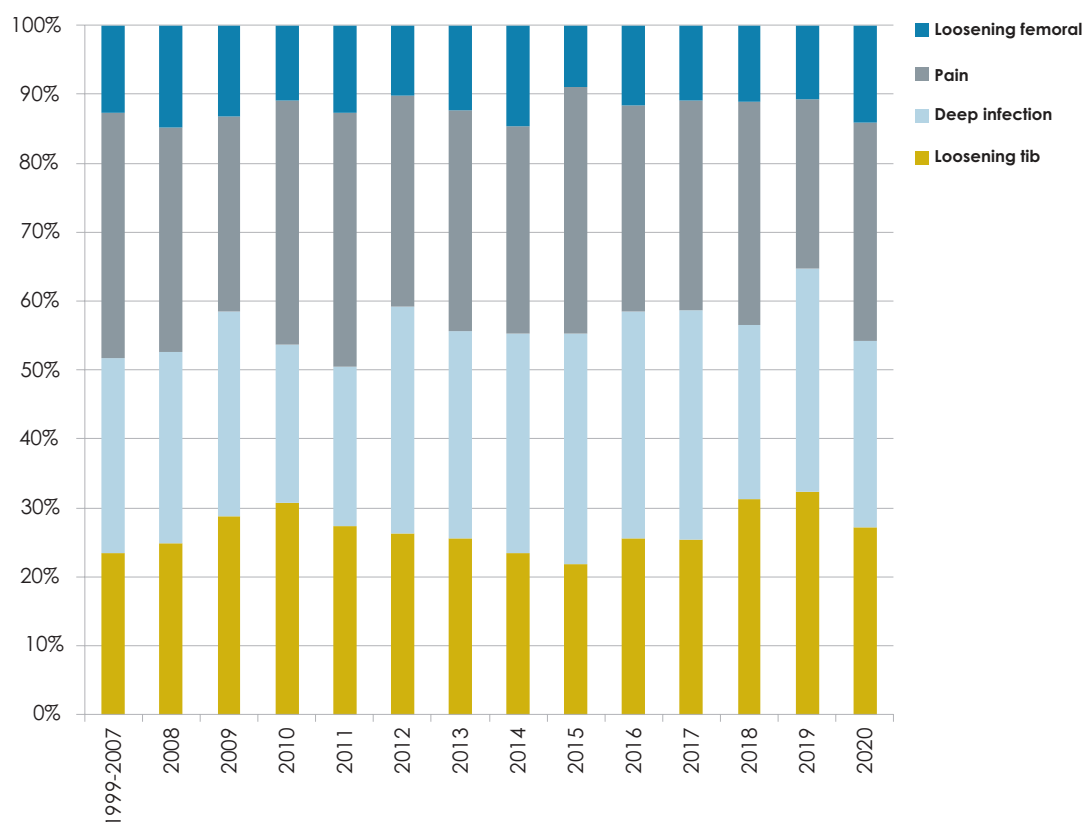
| Years | Loosening tibial component | | Deep infection | | Pain | | Loosening femoral component | |
|--------------|----------------------------|------|----------------|------|--------------|------|-----------------------------|------|
| | Count | % | Count | % | Count | % | Count | % |
| 0 | 51 | 4.8 | 461 | 39.1 | 158 | 12.4 | 18 | 3.8 |
| 1 | 92 | 8.7 | 210 | 17.8 | 317 | 24.9 | 41 | 8.6 |
| 2 | 125 | 11.9 | 114 | 9.7 | 193 | 15.2 | 37 | 7.7 |
| 3 | 113 | 10.7 | 97 | 8.2 | 117 | 9.2 | 36 | 7.5 |
| 4 | 91 | 8.6 | 60 | 5.1 | 85 | 6.7 | 47 | 9.8 |
| 5 | 85 | 8.1 | 43 | 3.6 | 65 | 5.1 | 39 | 8.1 |
| 6 | 91 | 8.6 | 44 | 3.7 | 53 | 4.2 | 32 | 6.7 |
| 7 | 76 | 7.2 | 31 | 2.6 | 55 | 4.3 | 32 | 6.7 |
| 8 | 52 | 4.9 | 23 | 1.9 | 48 | 3.8 | 27 | 5.6 |
| 9 | 59 | 5.6 | 24 | 2.0 | 30 | 2.4 | 26 | 5.4 |
| 10 | 46 | 4.4 | 18 | 1.5 | 37 | 2.9 | 25 | 5.2 |
| >10 | 172 | 16.3 | 55 | 4.7 | 113 | 8.9 | 119 | 24.8 |
| Total | 1,053 | | 1,180 | | 1,271 | | 479 | |

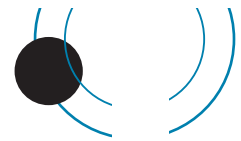


Analysis by numbers of the four main reasons for revision by year

| | Loosening tibial component | Deep infection | Pain | Loosening femoral component |
|-----------|----------------------------|----------------|--------|-----------------------------|
| Years | Number | Number | Number | Number |
| 1999-2007 | 140 | 169 | 213 | 76 |
| 2008 | 42 | 47 | 55 | 25 |
| 2009 | 52 | 54 | 51 | 24 |
| 2010 | 53 | 40 | 61 | 19 |
| 2011 | 52 | 44 | 70 | 24 |
| 2012 | 54 | 68 | 63 | 21 |
| 2013 | 62 | 73 | 78 | 30 |
| 2014 | 63 | 85 | 81 | 39 |
| 2015 | 59 | 91 | 97 | 24 |
| 2016 | 90 | 115 | 105 | 41 |
| 2017 | 86 | 112 | 103 | 37 |
| 2018 | 96 | 78 | 100 | 34 |
| 2019 | 109 | 110 | 83 | 36 |
| 2020 | 95 | 94 | 111 | 49 |

Percentage of the 4 main reasons for revision by year





REVISION OF PATELLO-FEMORAL KNEES

Of the 746 registered, n = 85 have been revised.

Time to revision – days

| | |
|--------------------|-----------------|
| Average | 1,822 (5 years) |
| Maximum | 5,718 |
| Minimum | 108 |
| Standard deviation | 1,494 |

Reason for revision

| | |
|----------------------------------|----|
| Pain | 28 |
| Deep infection | 7 |
| Loosening patellar | 4 |
| Loosening femoral | 1 |
| Wear in non-replaced compartment | 1 |

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.

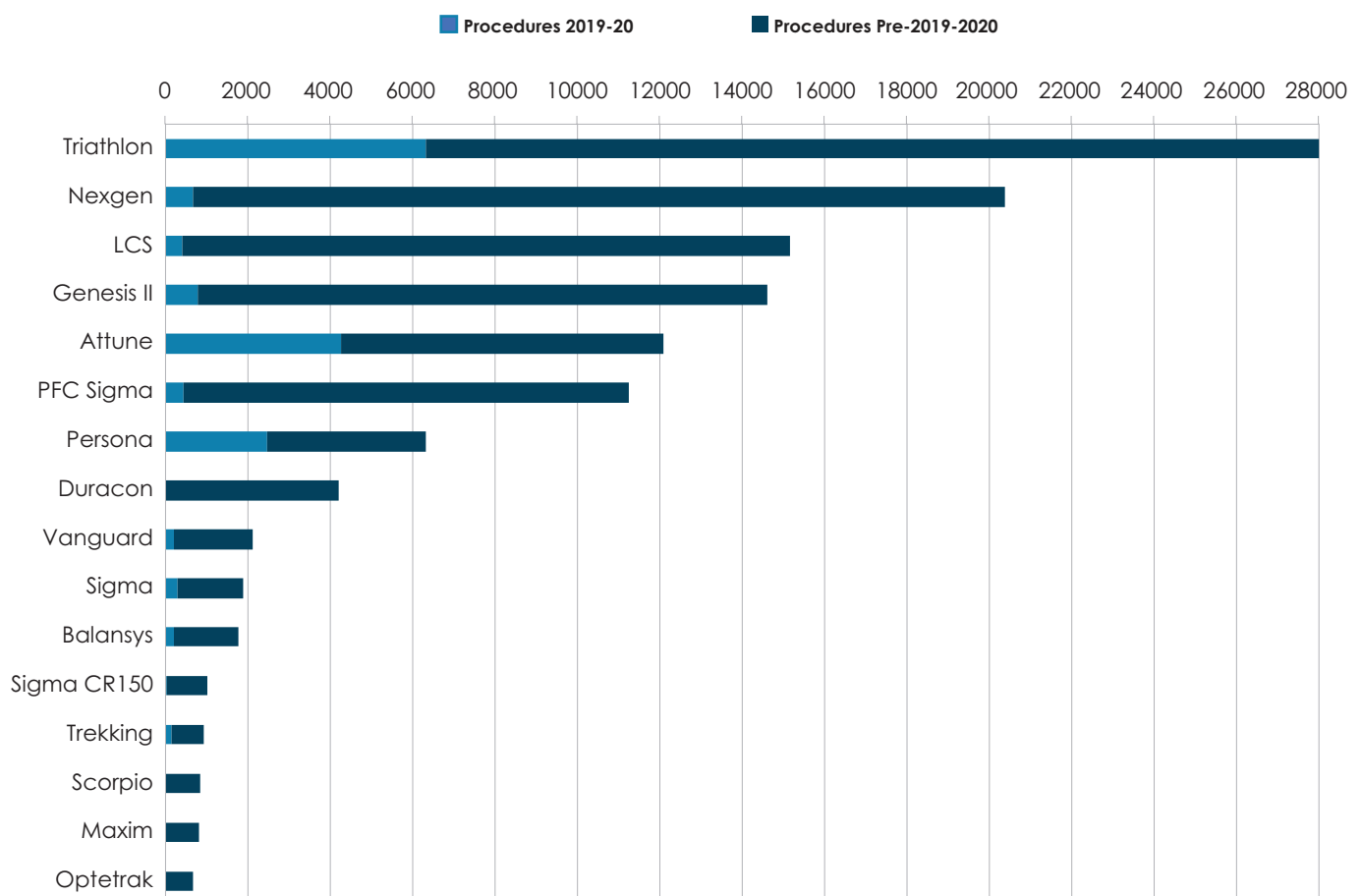
ii) Rate/100 component years

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

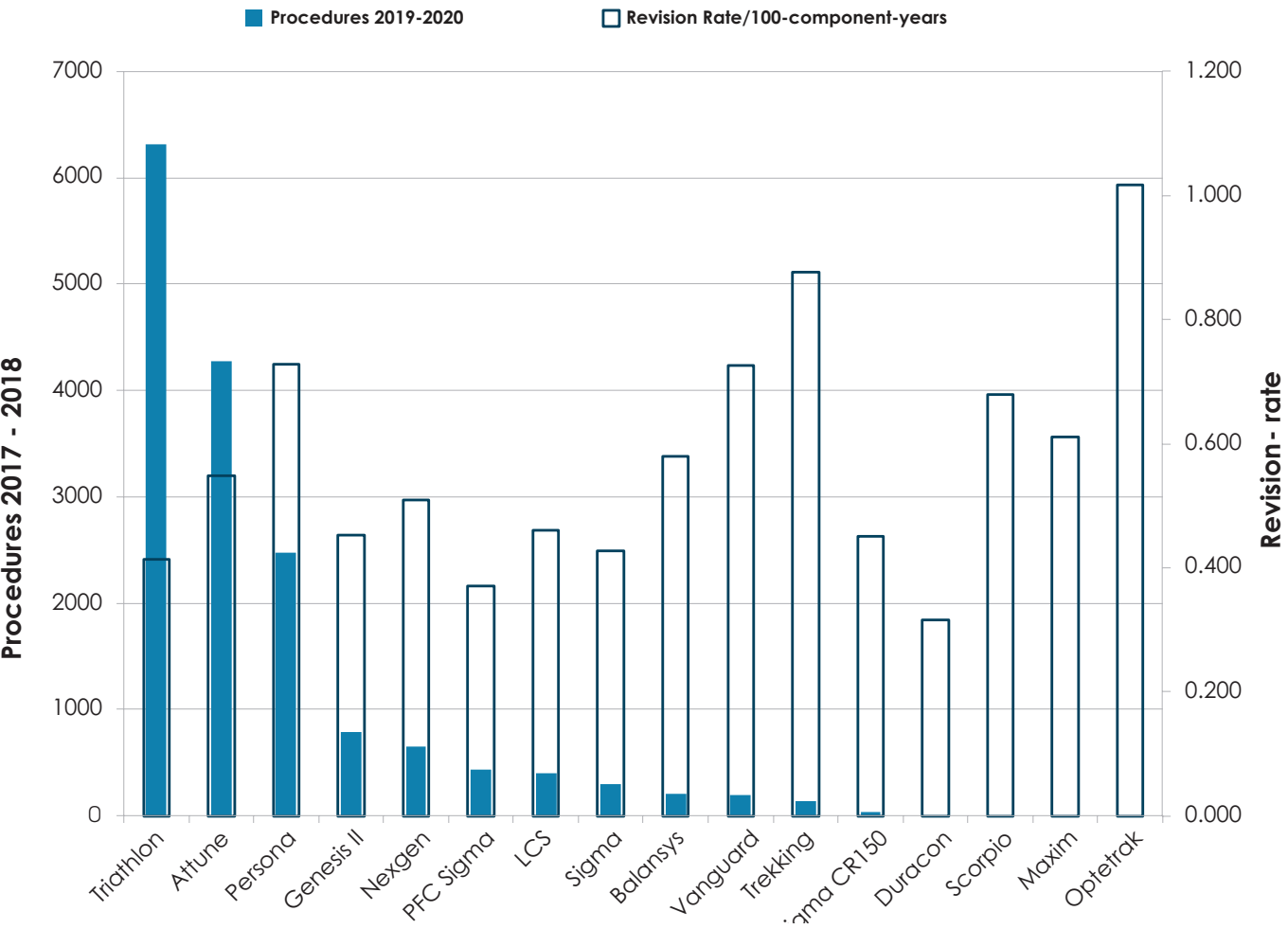
Where it is stated that a difference among results is significant the p value is 0.05 or less. In most of these situations this is because there is no overlap of the confidence intervals (CIs) but sometimes significance can apply in the presence of CI overlap.

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.



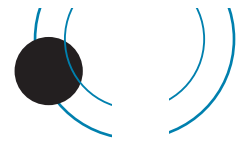


The figure below summarises the 16 Knee prostheses with >500 procedures. Showing the number of procedures for the previous 2 years and the historical revision rate.



All Primary Total Knee Arthroplasties

| No. Ops | Observed component years | Number revised | Rate/100 component-years | Exact 95% confidence interval | |
|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| 126,603 | 934,868.1 | 4,421 | 0.47 | 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 | 29,963 | 163,579.6 | 677 | 0.414 | 0.383 | 0.446 |
| Nexgen | 20,382 | 184,102.3 | 937 | 0.509 | 0.477 | 0.543 |
| LCS | 15,169 | 157,845.4 | 728 | 0.461 | 0.428 | 0.496 |
| Genesis II | 14,612 | 121,779.8 | 550 | 0.452 | 0.414 | 0.491 |
| Attune | 12,075 | 35,148.0 | 193 | 0.549 | 0.474 | 0.632 |
| PFC Sigma | 11,240 | 107,342.4 | 397 | 0.370 | 0.334 | 0.408 |
| Persona*# | 6,329 | 16,494.8 | 120 | 0.728 | 0.600 | 0.867 |
| Duracon | 4,213 | 53,280.6 | 168 | 0.315 | 0.269 | 0.367 |
| Vanguard*# | 2,279 | 14,638.1 | 104 | 0.710 | 0.581 | 0.861 |
| Sigma | 1,894 | 10,285.4 | 44 | 0.428 | 0.311 | 0.574 |
| Balansys | 1,759 | 9,503.5 | 55 | 0.579 | 0.436 | 0.753 |
| Sigma CR150 | 1,028 | 7,977.4 | 36 | 0.451 | 0.311 | 0.617 |
| Trekking*# | 934 | 4,337.3 | 38 | 0.876 | 0.610 | 1.189 |
| Scorpio* | 852 | 10,462.2 | 71 | 0.679 | 0.530 | 0.856 |
| Maxim | 822 | 10,484.8 | 64 | 0.610 | 0.470 | 0.779 |
| Optetrak* | 661 | 6,590.7 | 67 | 1.017 | 0.788 | 1.291 |
| AGC | 376 | 4,675.2 | 18 | 0.385 | 0.228 | 0.608 |
| Journey II BCS* | 293 | 854.6 | 10 | 1.170 | 0.561 | 2.152 |
| MBK | 256 | 3,622.3 | 18 | 0.497 | 0.295 | 0.785 |
| Legion | 250 | 1,334.2 | 9 | 0.675 | 0.308 | 1.280 |
| Insall/Burstein* | 249 | 3,098.9 | 48 | 1.549 | 1.128 | 2.035 |
| Advance | 157 | 1,915.3 | 6 | 0.313 | 0.115 | 0.682 |
| Journey BCS* | 143 | 1,369.4 | 15 | 1.095 | 0.613 | 1.807 |
| Saiph | 135 | 375.7 | 3 | 0.798 | 0.165 | 2.333 |
| AMK | 95 | 1,334.5 | 2 | 0.150 | 0.018 | 0.541 |
| ROCC | 66 | 717.4 | 6 | 0.836 | 0.307 | 1.820 |

Revision Rate of Individual Knee Prostheses Sorted by Revision Rate

(Minimum of 50 arthroplasties)

| Femur Prosthesis | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|------------------|---------|--------------------|----------------|--------------------------|-------------------------------|-------|
| Insall/Burstein* | 249 | 3,098.9 | 48 | 1.549 | 1.128 | 2.035 |
| Journey II BCS*# | 293 | 854.6 | 10 | 1.170 | 0.561 | 2.152 |
| Journey BCS* | 143 | 1,369.4 | 15 | 1.095 | 0.613 | 1.807 |
| Optetrak* | 661 | 6,590.7 | 67 | 1.017 | 0.788 | 1.291 |
| Trekking*# | 934 | 4,337.3 | 38 | 0.876 | 0.610 | 1.189 |
| ROCC | 66 | 717.4 | 6 | 0.836 | 0.307 | 1.820 |
| Saiph | 135 | 375.7 | 3 | 0.798 | 0.165 | 2.333 |
| Persona*# | 6,329 | 16,494.8 | 120 | 0.728 | 0.600 | 0.867 |
| Vanguard*# | 2,279 | 14,638.1 | 104 | 0.710 | 0.581 | 0.861 |
| Scorpio* | 852 | 10,462.2 | 71 | 0.679 | 0.530 | 0.856 |
| Legion | 250 | 1,334.2 | 9 | 0.675 | 0.308 | 1.280 |
| Maxim | 822 | 10,484.8 | 64 | 0.610 | 0.470 | 0.779 |
| Balansys | 1,759 | 9,503.5 | 55 | 0.579 | 0.436 | 0.753 |
| Attune | 12,075 | 35,148.0 | 193 | 0.549 | 0.474 | 0.632 |
| Nexgen | 20,382 | 184,102.3 | 937 | 0.509 | 0.477 | 0.543 |
| MBK | 256 | 3,622.3 | 18 | 0.497 | 0.295 | 0.785 |
| LCS | 15,169 | 157,845.4 | 728 | 0.461 | 0.428 | 0.496 |
| Genesis II | 14,612 | 121,779.8 | 550 | 0.452 | 0.414 | 0.491 |
| Sigma CR150 | 1,028 | 7,977.4 | 36 | 0.451 | 0.311 | 0.617 |
| Sigma | 1,894 | 10,285.4 | 44 | 0.428 | 0.311 | 0.574 |
| Triathlon | 29,963 | 163,579.6 | 677 | 0.414 | 0.383 | 0.446 |
| AGC | 376 | 4,675.2 | 18 | 0.385 | 0.228 | 0.608 |
| PFC Sigma | 11,240 | 107,342.4 | 397 | 0.370 | 0.334 | 0.408 |
| Duracon | 4,213 | 53,280.6 | 168 | 0.315 | 0.269 | 0.367 |
| Advance | 157 | 1,915.3 | 6 | 0.313 | 0.115 | 0.682 |
| AMK | 95 | 1,334.5 | 2 | 0.150 | 0.018 | 0.541 |

Those marked with an * in the above tables have revision rates significantly higher than the overall rate of 0.47/100 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.

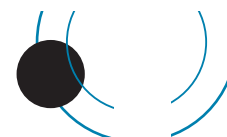
Those marked with a # as well as an * indicate those combinations used during 2020.

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

(Minimum of 50 arthroplasties)

| Femur Prosthesis | No. Ops | Observed component years | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|------------------|---------|--------------------------|----------------|--------------------------|-------------------------------|-------|
| Insall/Burstein | 249 | 3,098.9 | 48 | 1.549 | 1.128 | 2.035 |
| Optetrak | 281 | 2,832.3 | 34 | 1.200 | 0.831 | 1.677 |
| Journey II BCS | 293 | 854.6 | 10 | 1.170 | 0.561 | 2.152 |



| Femur Prosthesis | No. Ops | Observed component years | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|------------------|---------|--------------------------|----------------|--------------------------|-------------------------------|-------|
| Journey BCS | 143 | 1,369.4 | 15 | 1.095 | 0.613 | 1.807 |
| Trekking | 933 | 4,336.9 | 38 | 0.876 | 0.610 | 1.189 |
| Saiph | 135 | 375.7 | 3 | 0.798 | 0.165 | 2.333 |
| Persona | 6,308 | 16,478.3 | 120 | 0.728 | 0.601 | 0.867 |
| Vanguard | 2,258 | 14,501.6 | 102 | 0.703 | 0.574 | 0.854 |
| Legion | 247 | 1,322.0 | 9 | 0.681 | 0.311 | 1.292 |
| Scorpio | 852 | 10,462.2 | 71 | 0.679 | 0.530 | 0.856 |
| Maxim | 822 | 10,484.8 | 64 | 0.610 | 0.470 | 0.779 |
| Balansys | 1,759 | 9,503.5 | 55 | 0.579 | 0.436 | 0.753 |
| Attune | 11,482 | 34,188.8 | 185 | 0.541 | 0.466 | 0.625 |
| MBK | 247 | 3,506.6 | 18 | 0.513 | 0.304 | 0.811 |
| Nexgen | 19,444 | 175,590.2 | 899 | 0.512 | 0.479 | 0.547 |
| Sigma CR150 | 1,028 | 7,977.4 | 36 | 0.451 | 0.311 | 0.617 |
| Genesis II | 14,559 | 121,126.4 | 544 | 0.449 | 0.412 | 0.488 |
| Triathlon | 28,161 | 159,327.6 | 650 | 0.408 | 0.377 | 0.441 |
| LCS | 9,705 | 105,938.9 | 417 | 0.394 | 0.356 | 0.433 |
| AGC | 376 | 4,675.2 | 18 | 0.385 | 0.228 | 0.608 |
| Sigma | 1,540 | 8,900.7 | 33 | 0.371 | 0.251 | 0.514 |
| PFC Sigma | 10,342 | 100,273.9 | 358 | 0.357 | 0.321 | 0.395 |
| Duracon | 3,432 | 42,800.9 | 141 | 0.329 | 0.277 | 0.389 |
| Advance | 157 | 1,915.3 | 6 | 0.313 | 0.115 | 0.682 |
| AMK | 95 | 1,334.5 | 2 | 0.150 | 0.018 | 0.541 |

The Insall/Burstein, Trekking, Journey, Scorpio, Vanguard, Persona and Optetrak have significantly higher revision rates than the overall rate of 0.47/100 component years at the 95% confidence interval. The Vanguard, Trekking and Persona prostheses were implanted in 2020.

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 | |
|------------------|---------|--------------------------|----------------|--------------------------|-------------------------------|--------|
| Attune | 72 | 61.2 | 2 | 3.269 | 0.396 | 11.809 |
| Optetrak | 380 | 3,758.4 | 33 | 0.878 | 0.604 | 1.233 |
| Sigma | 354 | 1,384.7 | 11 | 0.794 | 0.397 | 1.421 |
| Genesis II | 51 | 642.0 | 5 | 0.779 | 0.210 | 1.707 |
| Triathlon | 332 | 1,946.0 | 14 | 0.719 | 0.393 | 1.207 |
| PFC Sigma | 891 | 6,985.5 | 39 | 0.558 | 0.391 | 0.755 |
| Nexgen | 707 | 6,363.2 | 28 | 0.440 | 0.292 | 0.636 |
| LCS | 2,344 | 23,184.0 | 102 | 0.440 | 0.357 | 0.532 |
| Duracon | 321 | 4,743.0 | 15 | 0.316 | 0.169 | 0.508 |

The Optetrak is the only hybrid fixation prosthesis with significantly higher revision rates than the overall rate of 0.47/100 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)

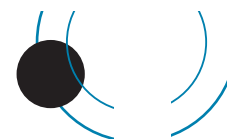
| Femur Prosthesis | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|------------------|---------|--------------------|----------------|--------------------------|-------------------------------|-------|
| LCS | 3,120 | 28,722.5 | 209 | 0.728 | 0.631 | 0.831 |
| Attune | 521 | 898.1 | 6 | 0.668 | 0.245 | 1.454 |
| Triathlon | 1,470 | 2,306.0 | 13 | 0.564 | 0.284 | 0.937 |
| Nexgen | 231 | 2,148.9 | 10 | 0.465 | 0.223 | 0.856 |
| Duracon | 460 | 5,736.7 | 12 | 0.209 | 0.102 | 0.354 |

The uncemented LCS were still implanted in 2020 and have a significantly higher revision rate than the overall rate of 0.47/100 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 | 4,675.2 | 18 | 0.385 | 0.228 | 0.608 |
| AMK | Fixed | 95 | 1,334.5 | 2 | 0.150 | 0.018 | 0.541 |
| Balansys | Fixed | 1,743 | 9,468.9 | 55 | 0.581 | 0.438 | 0.756 |
| Duracon | Fixed | 4,207 | 53,192.2 | 167 | 0.314 | 0.268 | 0.365 |
| Genesis II | Fixed | 14,590 | 121,726.2 | 550 | 0.452 | 0.414 | 0.491 |
| Insall/Burstein | Fixed | 249 | 3,098.9 | 48 | 1.549 | 1.128 | 2.035 |
| Journey | Fixed | 300 | 2,000.8 | 21 | 1.050 | 0.650 | 1.604 |
| Triathlon | Fixed | 26,830 | 154,775.5 | 641 | 0.414 | 0.383 | 0.447 |
| LCS | Mobile | 15,167 | 157,838.1 | 728 | 0.461 | 0.428 | 0.496 |
| Maxim | Fixed | 822 | 10,484.8 | 64 | 0.610 | 0.470 | 0.779 |
| MBK | Mobile | 256 | 3,622.3 | 18 | 0.497 | 0.295 | 0.785 |
| Trekking | Mobile | 923 | 4,303.6 | 37 | 0.860 | 0.605 | 1.185 |
| Persona | Fixed | 6,323 | 16,493.4 | 120 | 0.728 | 0.600 | 0.867 |
| Nexgen | Fixed | 17,387 | 155,301.2 | 815 | 0.525 | 0.489 | 0.562 |
| | Mobile | 2,715 | 26,766.5 | 103 | 0.385 | 0.314 | 0.467 |
| PFC Sigma | Fixed | 7,759 | 69,363.4 | 262 | 0.378 | 0.333 | 0.426 |
| | Mobile | 3,447 | 37,679.3 | 134 | 0.356 | 0.298 | 0.421 |
| Scorpio | Fixed | 737 | 9,052.9 | 60 | 0.663 | 0.506 | 0.853 |
| | Mobile | 104 | 1,333.8 | 8 | 0.600 | 0.259 | 1.182 |
| Sigma | Fixed | 694 | 3,679.6 | 11 | 0.299 | 0.149 | 0.535 |
| | Mobile | 1,178 | 6,474.3 | 33 | 0.510 | 0.344 | 0.707 |
| Sigma CR150 | Fixed | 188 | 1,505.4 | 11 | 0.731 | 0.365 | 1.307 |
| | Mobile | 839 | 6,465.8 | 25 | 0.387 | 0.244 | 0.562 |
| Attune | Fixed | 4,941 | 16,349.8 | 73 | 0.446 | 0.350 | 0.561 |
| | Mobile | 5,995 | 18,481.1 | 113 | 0.611 | 0.504 | 0.735 |

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 | 87,335 | 632,975.1 | 2,922 | 0.46 | 0.44 | 0.48 |
| Mobile | 30,659 | 263,107.0 | 1,200 | 0.46 | 0.43 | 0.48 |

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 | 389.5 | 4 | 1.027 | 0.280 | 2.629 |
| Insall/Burstein | PS | 249 | 3,098.9 | 48 | 1.549 | 1.128 | 2.035 |
| LCS | PS | 70 | 564.7 | 3 | 0.531 | 0.110 | 1.553 |
| Legion | PS | 200 | 1,091.0 | 7 | 0.642 | 0.230 | 1.260 |
| Sigma CR150 | CR | 1,028 | 7,977.4 | 36 | 0.451 | 0.311 | 0.617 |
| Attune | CR | 7,424 | 22,393.2 | 123 | 0.549 | 0.457 | 0.655 |
| | PS | 4,616 | 12,718.2 | 70 | 0.550 | 0.429 | 0.695 |
| Balansys | CR | 1,629 | 8,856.0 | 47 | 0.531 | 0.385 | 0.699 |
| | PS | 113 | 607.9 | 8 | 1.316 | 0.568 | 2.593 |
| Genesis II | CR | 7,809 | 69,394.3 | 218 | 0.314 | 0.273 | 0.358 |
| | PS | 6,796 | 52,332.1 | 332 | 0.634 | 0.568 | 0.706 |
| Maxim | CR | 657 | 8,339.5 | 45 | 0.540 | 0.394 | 0.722 |
| | PS | 165 | 2,145.3 | 19 | 0.886 | 0.533 | 1.383 |
| Nexgen | CR | 9,883 | 86,475.5 | 348 | 0.402 | 0.361 | 0.446 |
| | PS | 10,118 | 95,537.3 | 558 | 0.584 | 0.536 | 0.634 |
| Optetrak | CR | 437 | 4,384.8 | 38 | 0.867 | 0.613 | 1.190 |
| | PS | 224 | 2,205.9 | 29 | 1.315 | 0.862 | 1.861 |
| Persona | CR | 5,033 | 12,437.3 | 82 | 0.659 | 0.524 | 0.818 |
| | PS | 1,290 | 4,056.1 | 38 | 0.937 | 0.653 | 1.272 |
| PFC Sigma | CR | 9,277 | 85,469.5 | 291 | 0.340 | 0.302 | 0.381 |
| | PS | 1,891 | 21,199.6 | 103 | 0.486 | 0.397 | 0.589 |
| Scorpio | CR | 739 | 9,268.0 | 60 | 0.647 | 0.489 | 0.827 |
| | PS | 111 | 1,177.7 | 11 | 0.934 | 0.437 | 1.616 |
| Sigma | CR | 347 | 1,653.9 | 1 | 0.060 | 0.000 | 0.283 |
| | PS | 1,547 | 8,631.5 | 43 | 0.498 | 0.356 | 0.664 |
| Trekking | CR | 342 | 1,659.1 | 16 | 0.964 | 0.529 | 1.529 |
| | PS | 581 | 2,644.6 | 21 | 0.794 | 0.477 | 1.191 |
| Triathlon | CR | 26,600 | 138,794.7 | 561 | 0.404 | 0.371 | 0.439 |
| | PS | 3,361 | 24,775.3 | 116 | 0.468 | 0.387 | 0.562 |
| Vanguard | CR | 1,640 | 10,563.5 | 66 | 0.625 | 0.483 | 0.795 |
| | PS | 610 | 3,968.8 | 38 | 0.957 | 0.667 | 1.300 |



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 | 72,845 | 467,666.6 | 1,932 | 0.41 | 0.39 | 0.43 |
| Other | 15,407 | 161,574.8 | 749 | 0.46 | 0.43 | 0.50 |
| PS | 31,974 | 237,175.4 | 1,449 | 0.61 | 0.58 | 0.64 |

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 | 115,221 | 845,125.8 | 3,910 | 0.46 | 0.45 | 0.48 |
| Uncemented | 5,859 | 40,254.6 | 256 | 0.64 | 0.56 | 0.72 |
| Hybrid | 5,523 | 49,487.7 | 255 | 0.52 | 0.45 | 0.58 |

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 | 381 | 3,868.5 | 52 | 1.34 | 0.99 | 1.75 |
| 40-54 | 9,990 | 81,447.4 | 702 | 0.86 | 0.80 | 0.93 |
| 55-64 | 35,379 | 277,285.2 | 1,642 | 0.59 | 0.56 | 0.62 |
| 65-74 | 48,939 | 363,307.0 | 1,494 | 0.41 | 0.39 | 0.43 |
| >=75 | 31,914 | 208,960.1 | 531 | 0.25 | 0.23 | 0.28 |

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

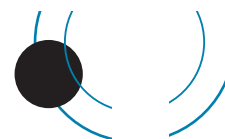
Revision vs Gender

| Gender | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|--------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| F | 65,160 | 490,744.7 | 2,121 | 0.43 | 0.41 | 0.45 |
| M | 61,443 | 444,123.4 | 2,300 | 0.52 | 0.50 | 0.54 |

The revision rate for males in TKA 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 | 309 | 3,131.6 | 38 | 1.21 | 0.86 | 1.67 |
| 40-54 | 8,546 | 68,261.5 | 567 | 0.83 | 0.76 | 0.90 |
| 55-64 | 31,537 | 245,257.1 | 1,443 | 0.59 | 0.56 | 0.62 |
| 65-74 | 45,025 | 333,446.4 | 1,376 | 0.41 | 0.39 | 0.44 |
| >=75 | 29,804 | 195,029.1 | 486 | 0.25 | 0.23 | 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 | 35 | 375.4 | 8 | 2.13 | 0.92 | 4.20 |
| 40-54 | 798 | 7,104.4 | 81 | 1.14 | 0.90 | 1.41 |
| 55-64 | 2,079 | 15,035.0 | 97 | 0.65 | 0.52 | 0.78 |
| 65-74 | 1,973 | 12,431.9 | 55 | 0.44 | 0.33 | 0.57 |
| >=75 | 974 | 5,307.9 | 15 | 0.28 | 0.16 | 0.47 |

| Hybrid | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|--------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| <40 | 37 | 361.5 | 6 | 1.66 | 0.61 | 3.61 |
| 40-54 | 646 | 6,081.4 | 54 | 0.89 | 0.66 | 1.15 |
| 55-64 | 1,763 | 16,993.1 | 102 | 0.60 | 0.49 | 0.73 |
| 65-74 | 1,941 | 17,428.6 | 63 | 0.36 | 0.28 | 0.46 |
| >=75 | 1,136 | 8,623.1 | 30 | 0.35 | 0.23 | 0.50 |

Revision vs Approach

| Approach | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|----------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| Medial | 113,858 | 841,245.8 | 3,930 | 0.47 | 0.45 | 0.48 |
| Lateral | 1,506 | 12,903.0 | 81 | 0.63 | 0.50 | 0.78 |
| Other | 2,624 | 21,667.4 | 83 | 0.38 | 0.31 | 0.47 |

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

Revision vs. Surgical Adjuncts

| Adjunct computer navigation | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|-----------------------------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| No | 107,850 | 834,232.1 | 3,974 | 0.48 | 0.46 | 0.49 |
| Yes | 18,753 | 100,635.9 | 447 | 0.44 | 0.40 | 0.49 |

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 | 2,394 | 20,562.1 | 87 | 0.42 | 0.34 | 0.52 |
| 10-24 | 24,497 | 194,299.5 | 1,032 | 0.53 | 0.50 | 0.56 |
| 25-49 | 54,505 | 408,906.7 | 1,919 | 0.47 | 0.45 | 0.49 |
| 50-74 | 25,852 | 181,829.6 | 857 | 0.47 | 0.44 | 0.50 |
| 75-99 | 8,716 | 57,928.8 | 190 | 0.33 | 0.28 | 0.38 |
| >=100 | 10,639 | 71,341.4 | 336 | 0.47 | 0.42 | 0.52 |

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



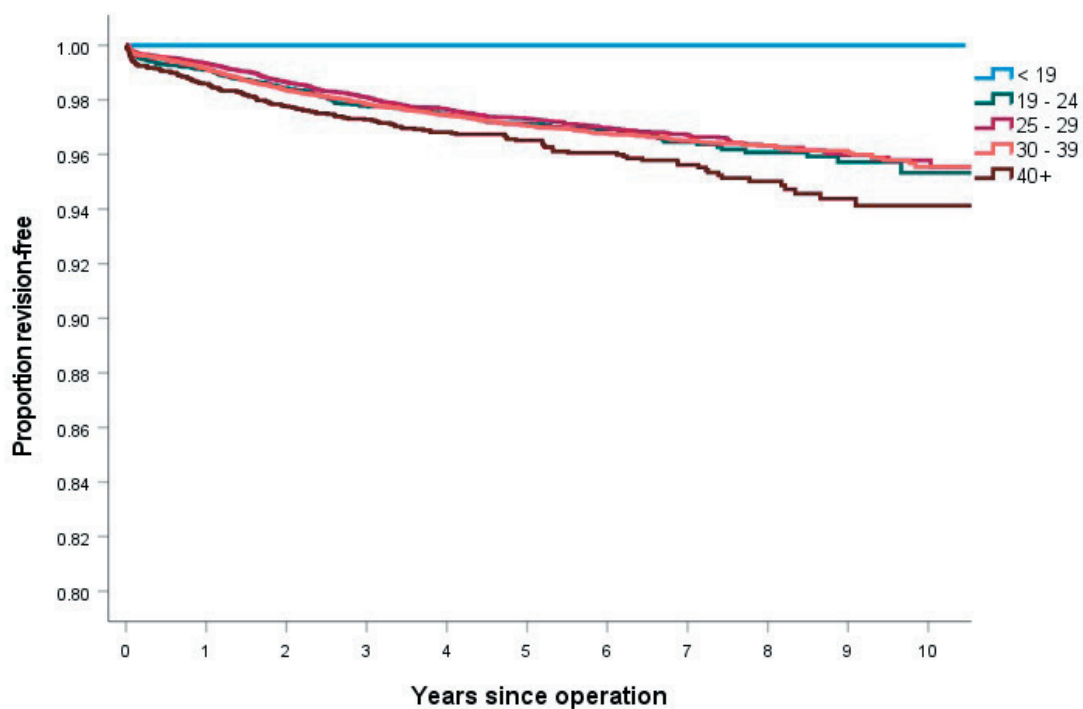
Revision vs ASA Status

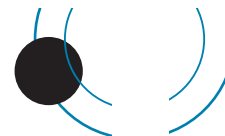
| ASA Class | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|-----------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| 1 | 11,204 | 76,973.0 | 381 | 0.49 | 0.45 | 0.55 |
| 2 | 66,202 | 420,459.9 | 1,950 | 0.46 | 0.44 | 0.48 |
| 3 | 26,341 | 148,322.0 | 811 | 0.55 | 0.51 | 0.59 |
| 4 | 421 | 1,968.2 | 13 | 0.66 | 0.35 | 1.13 |

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 | 105 | 486.4 | 0 | 0.00 | 0.00 | 0.76 |
| 19 - 24 | 5,998 | 26,272.7 | 152 | 0.58 | 0.49 | 0.68 |
| 25 - 29 | 18,331 | 79,920.1 | 423 | 0.53 | 0.48 | 0.58 |
| 30 - 39 | 26,396 | 113,238.7 | 647 | 0.57 | 0.53 | 0.62 |
| 40+ | 5,382 | 22,767.0 | 173 | 0.76 | 0.65 | 0.88 |

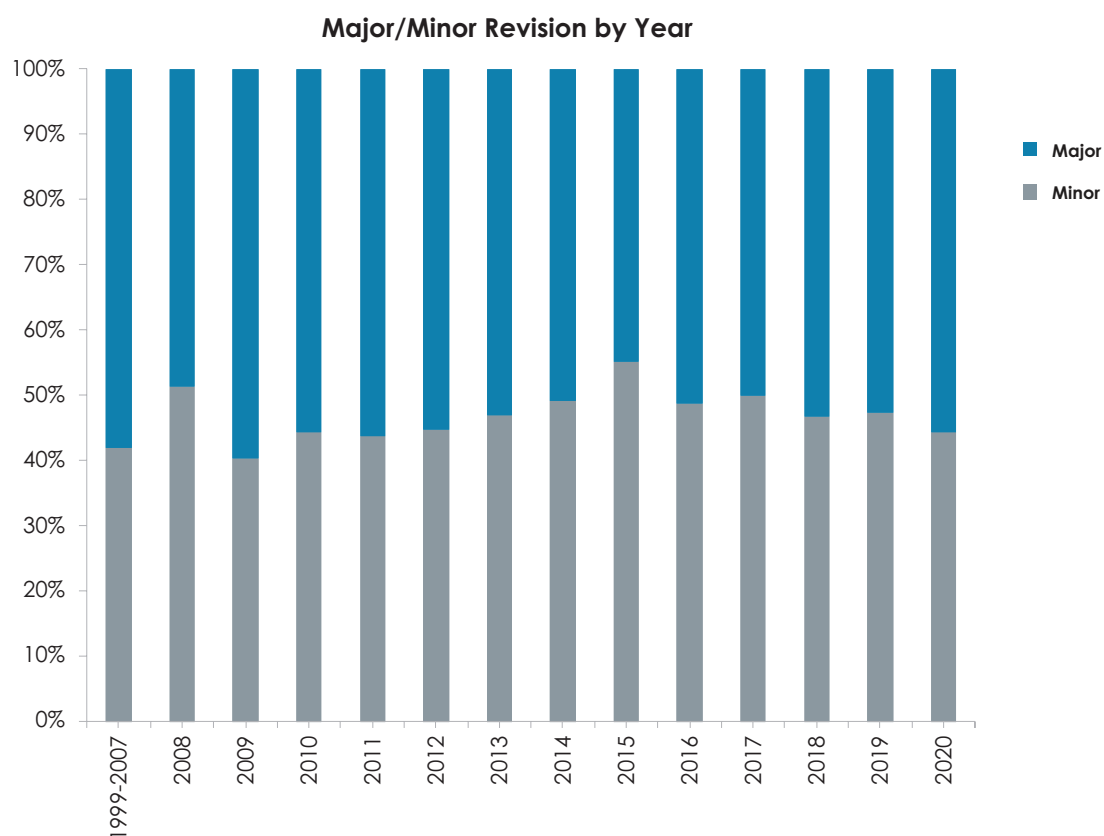
40+ group has a significantly higher revision rate than the two groups before it.





Comparison of Major vs. Minor Revisions by Year

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



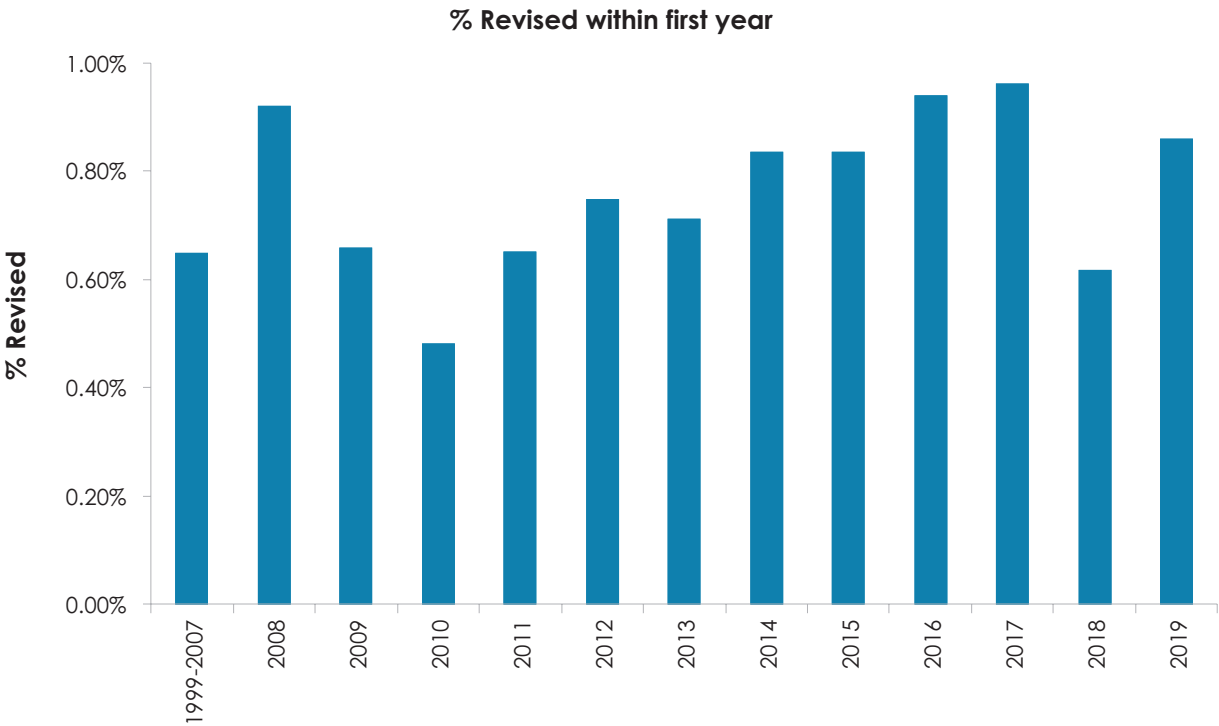
Re revisions for major vs. minor knee revisions

| Major/Minor | No. Ops | Observed comp. yrs | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|-------------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| Minor | 2,062 | 10,641.9 | 342 | 3.21 | 2.57 | 3.75 |
| Major | 2,359 | 12,844.3 | 349 | 2.72 | 2.44 | 3.02 |

There is a significantly higher re-revision rate for minor (addition of a patellar component or change of polyethylene liner) compared to major change (change of femoral and /or tibial component) revisions.



Percentage of knees revised in the first year



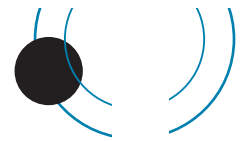
Patello-Femoral Arthroplasty

| No. Ops | Observed component years | Number revised | Rate/100 component years | Exact 95% confidence interval | |
|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| 746 | 4,184.7 | 85 | 2.03 | 1.61 | 2.50 |

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

Revised to:

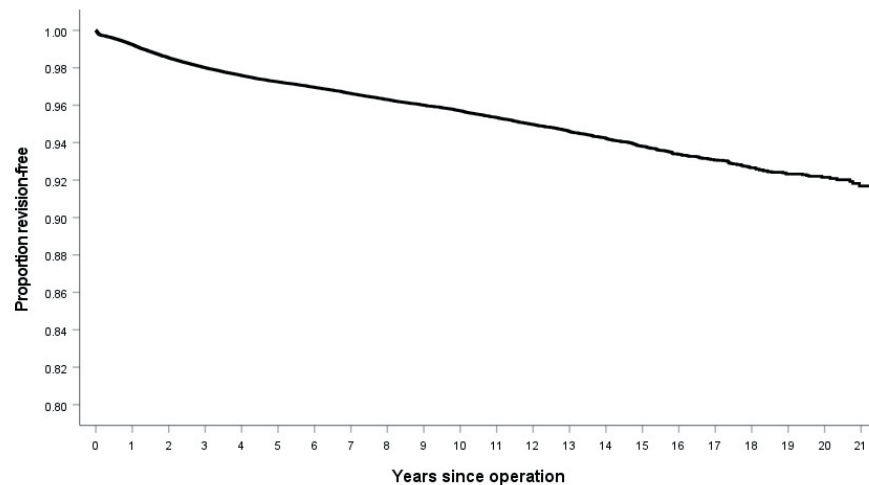
| | |
|------------------|----|
| Total | 79 |
| Patello- Femoral | 3 |
| Uniknee | 3 |



KAPLAN MEIER CURVES

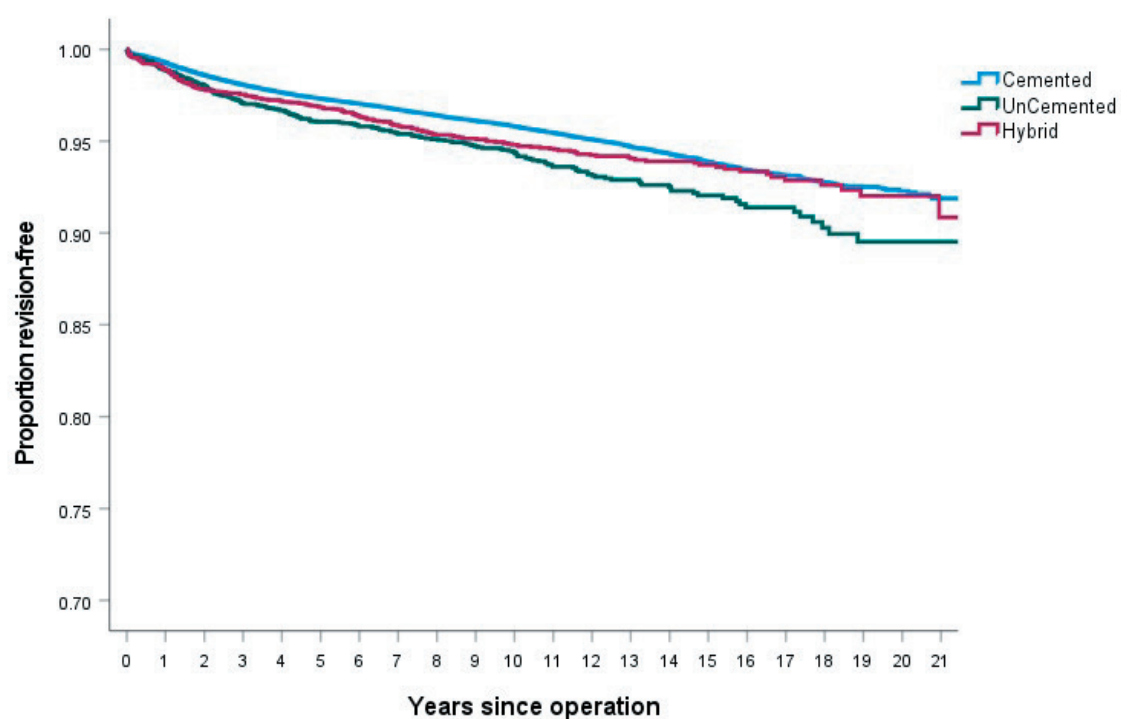
The following Kaplan Meier survival analyses are for the 22 years 1999 – 2020 with deceased patients censored at time of death.

All Knees



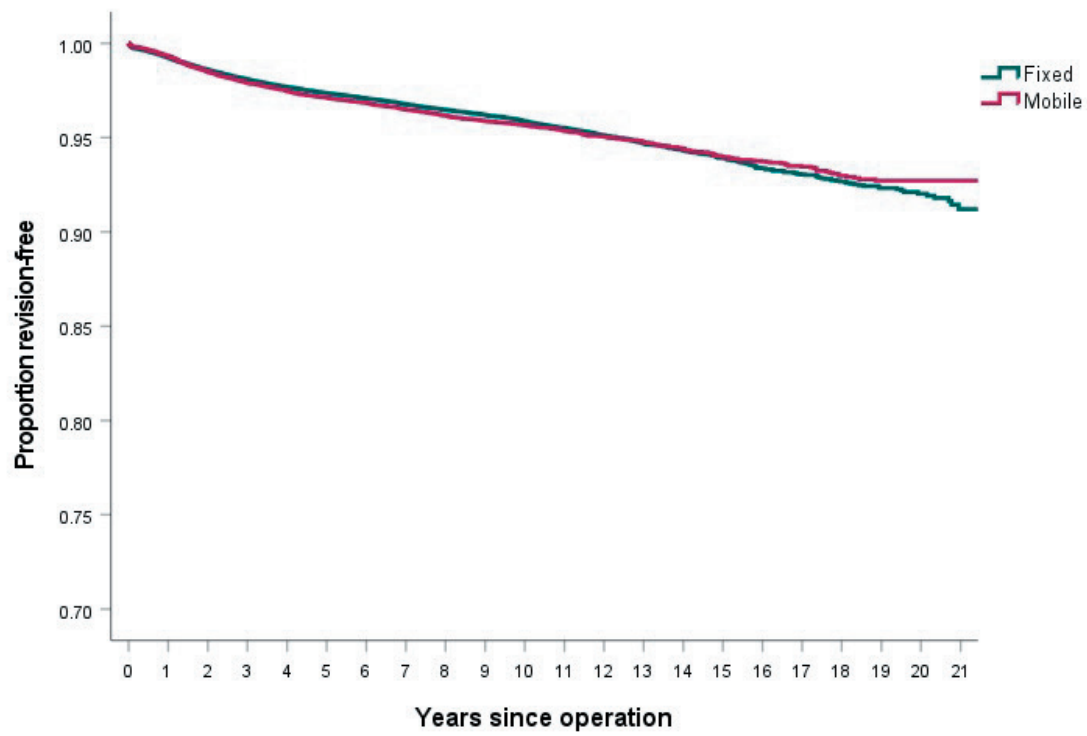
| Years | % Revision-free | No. in each year |
|-------|-----------------|------------------|
| 1 | 99.2 | 116,612 |
| 2 | 98.5 | 106,337 |
| 3 | 98.0 | 96,173 |
| 4 | 97.6 | 86,237 |
| 5 | 97.3 | 76,983 |
| 6 | 97.0 | 68,231 |
| 7 | 96.6 | 59,621 |
| 8 | 96.3 | 51,817 |
| 9 | 96.0 | 44,543 |
| 10 | 95.7 | 37,668 |
| 11 | 95.3 | 31,354 |
| 12 | 95.0 | 25,550 |
| 13 | 94.6 | 20,371 |
| 14 | 94.2 | 15,663 |
| 15 | 93.8 | 11,838 |
| 16 | 93.4 | 8,481 |
| 17 | 93.1 | 5,998 |
| 18 | 92.7 | 4,270 |
| 19 | 92.3 | 2,890 |
| 20 | 92.2 | 1,657 |
| 21 | 91.7 | 665 |

Cemented vs Uncemented vs Hybrid

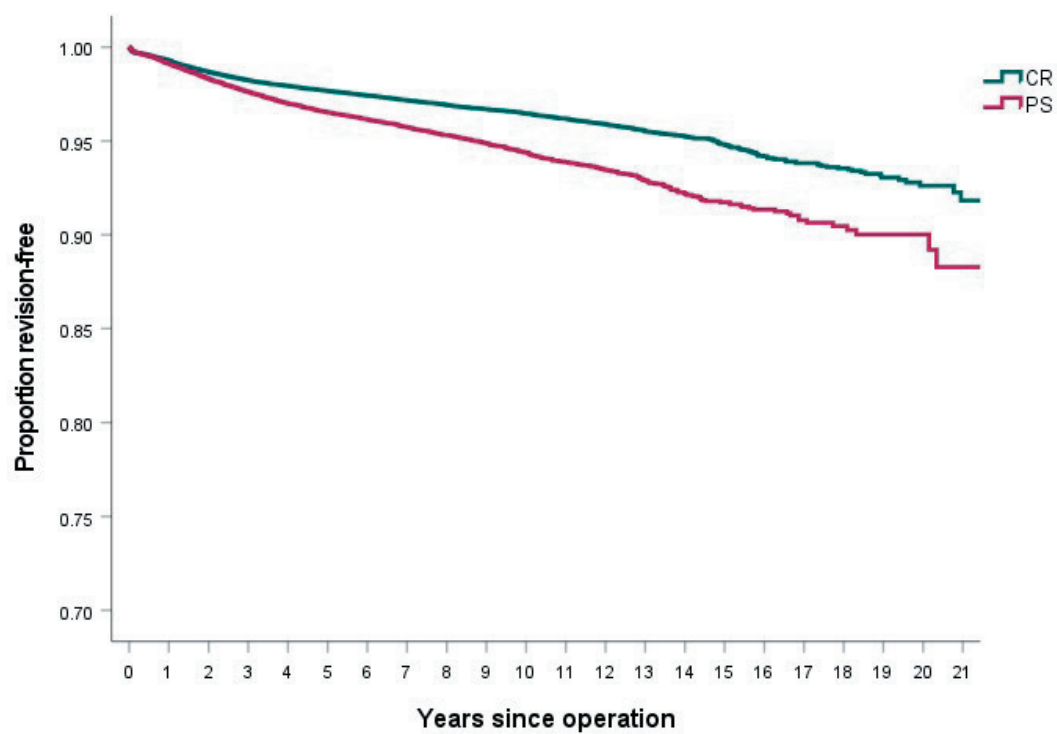


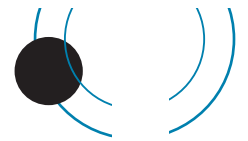


Fixed vs. Mobile knees

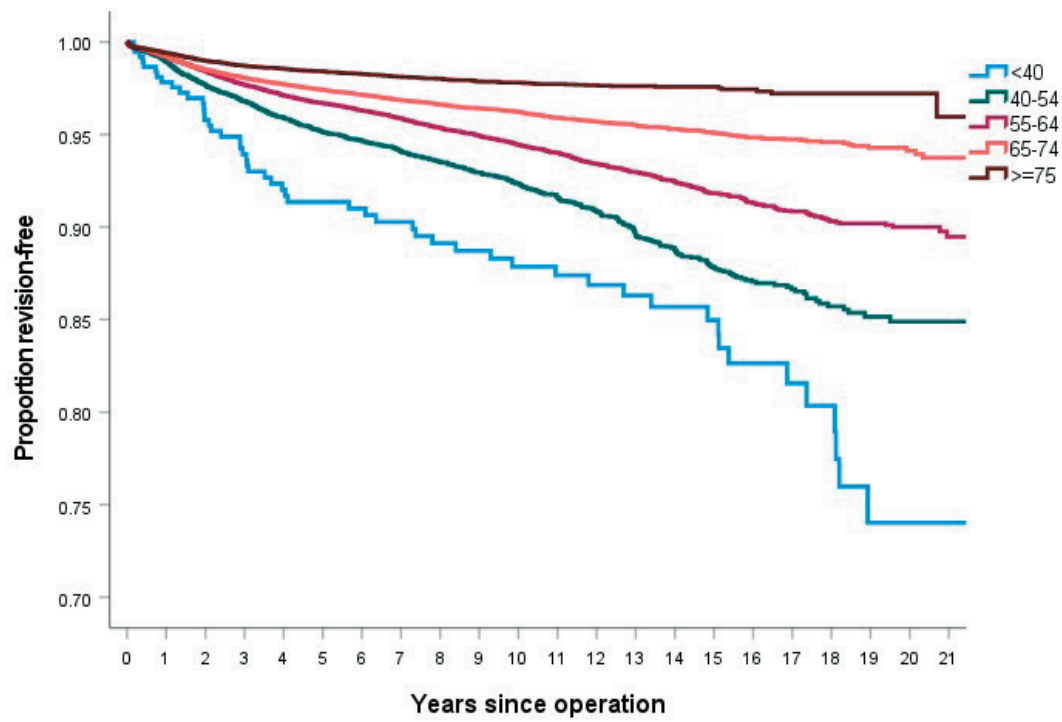


Posterior Stabilised vs. Cruciate Retaining

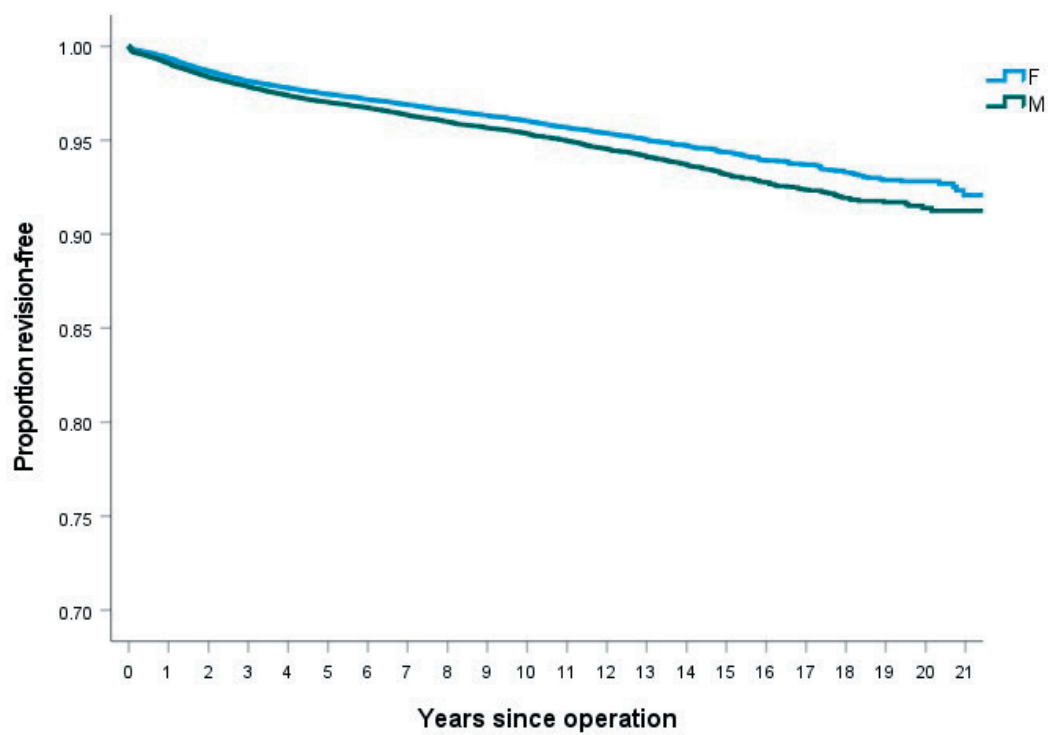




Survival for age bands

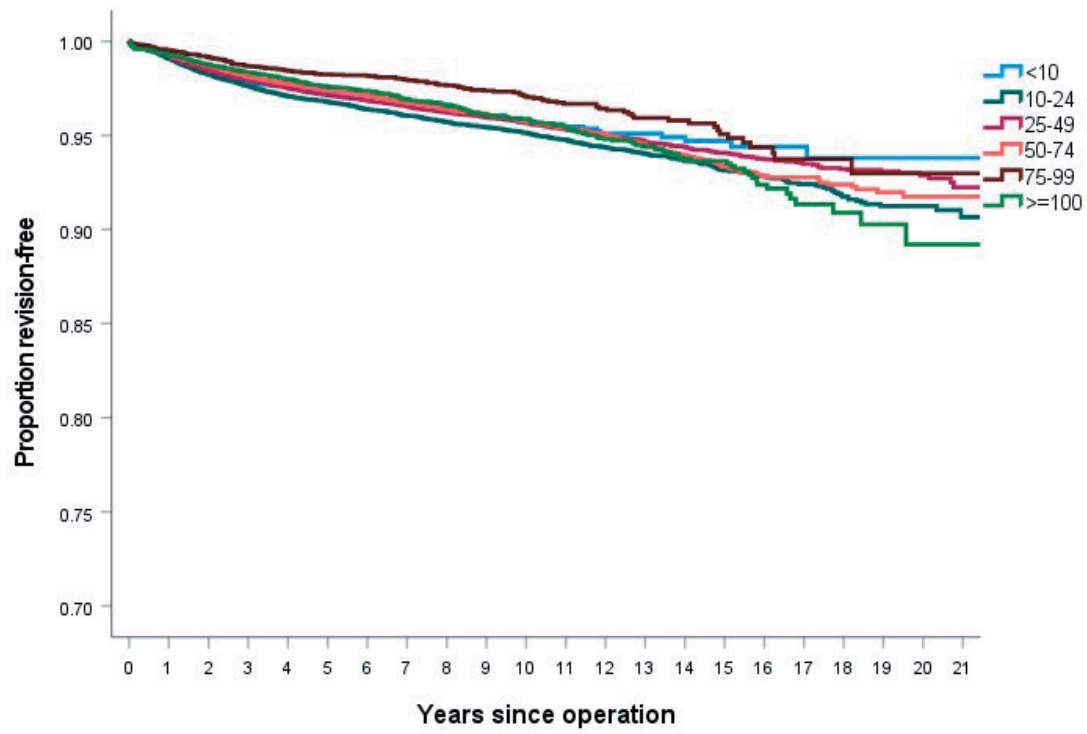


Survival for male vs. female

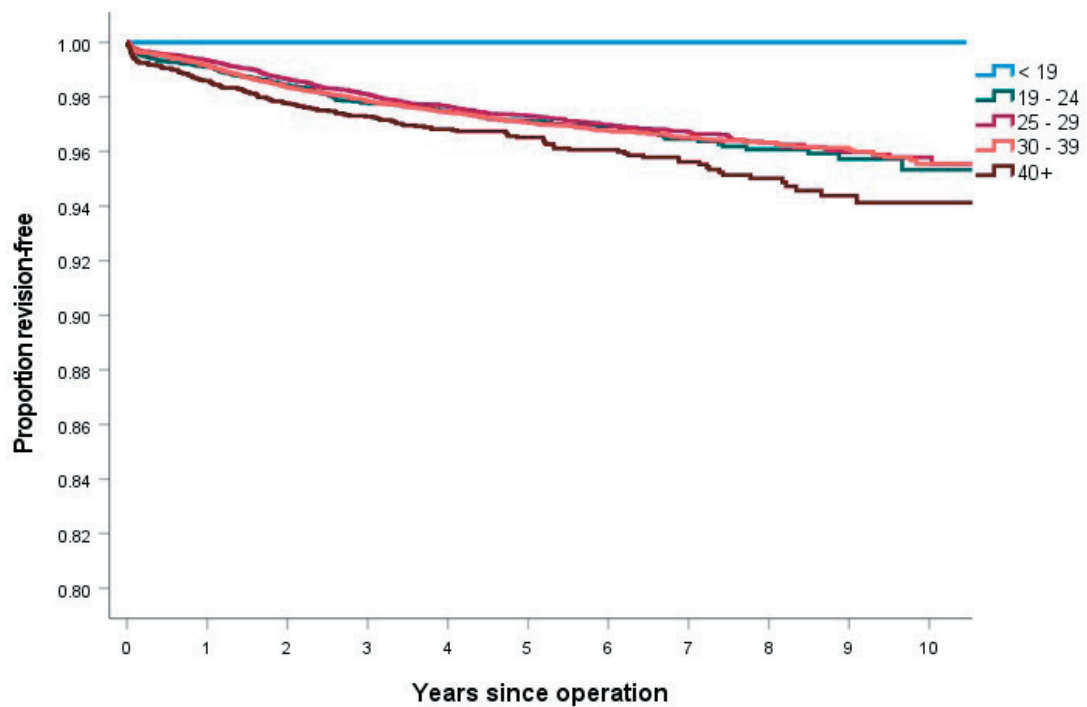


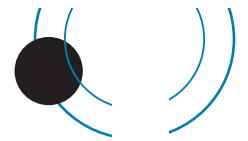


Survival for surgeon annual output

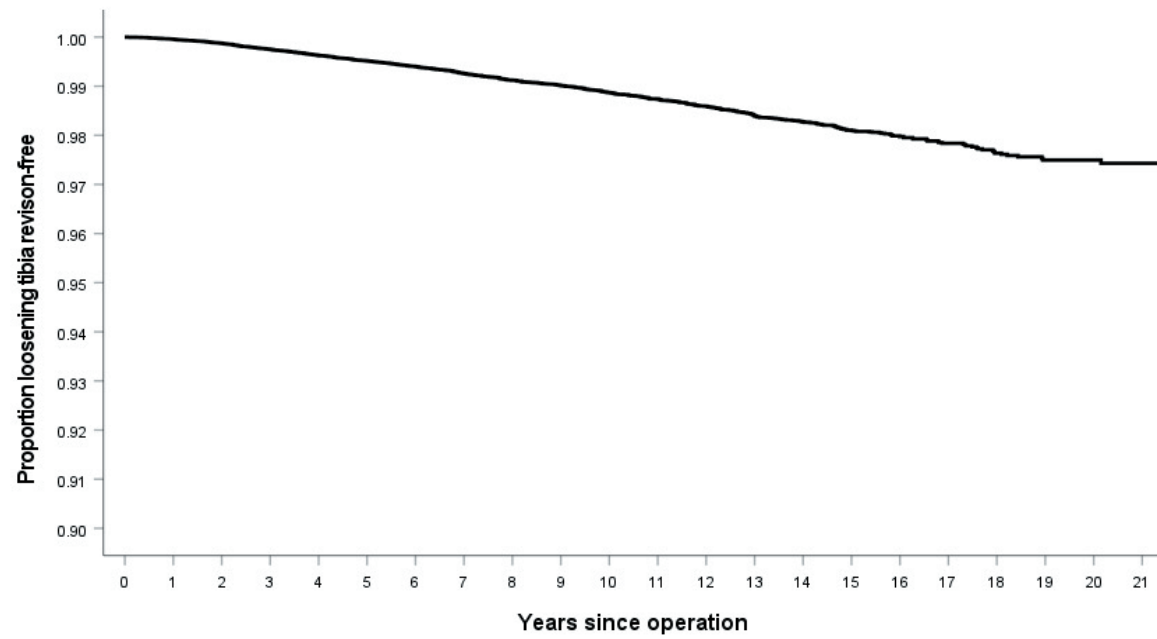


Survival for BMI groups

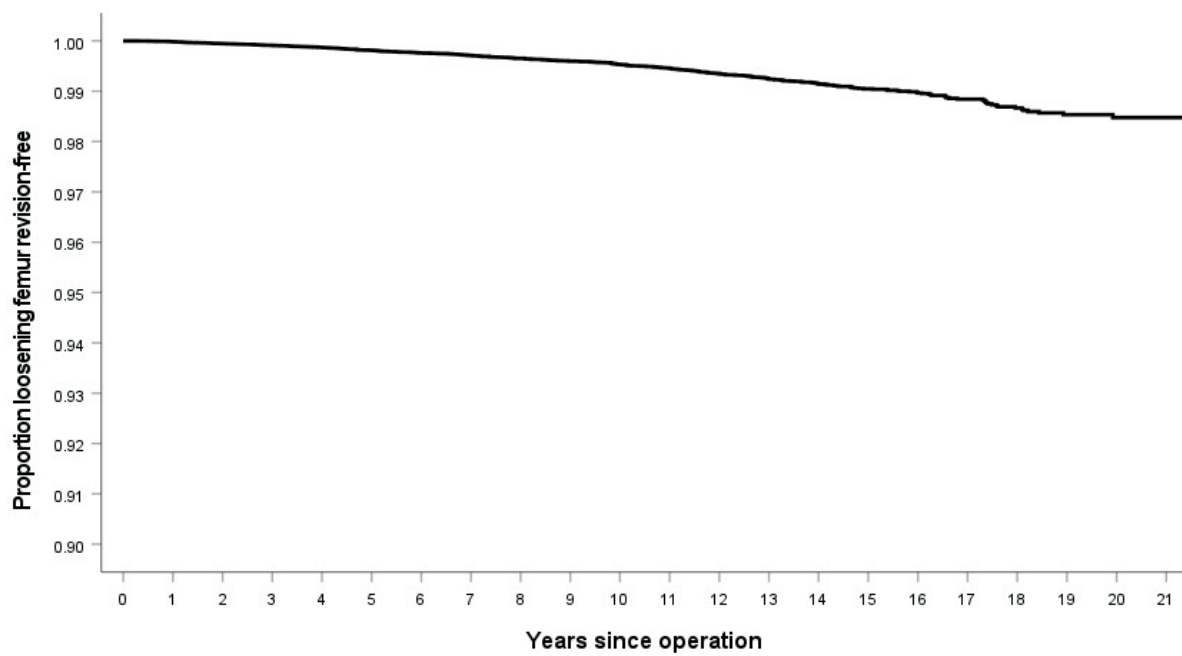




Tibial loosening

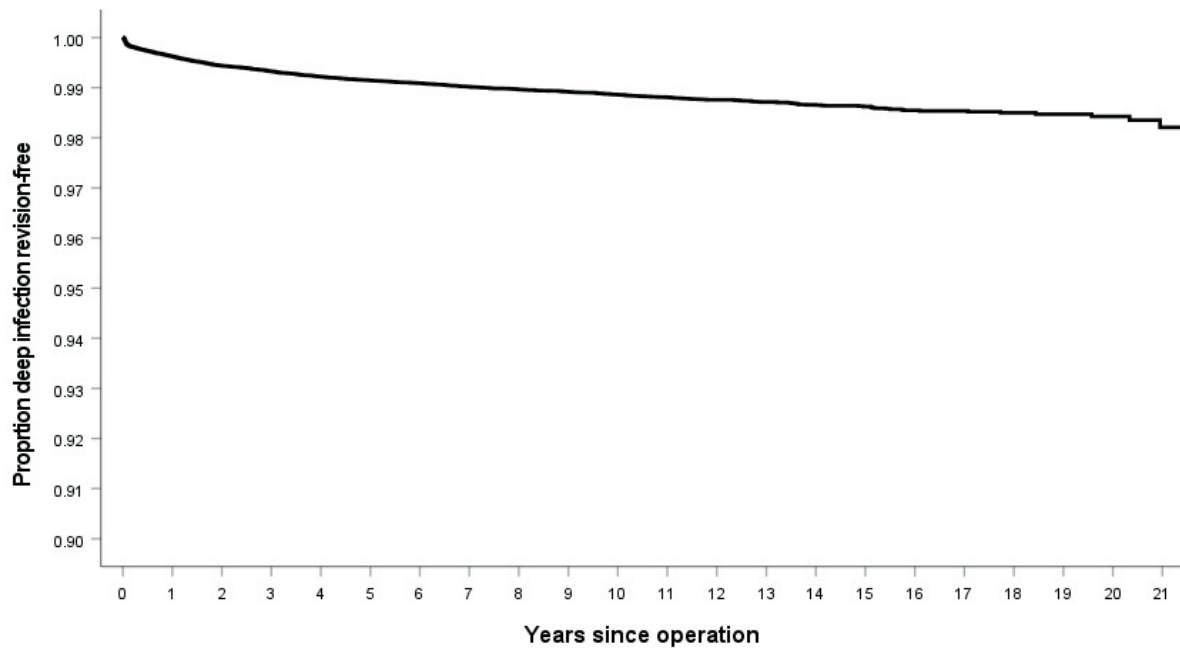


Femoral loosening

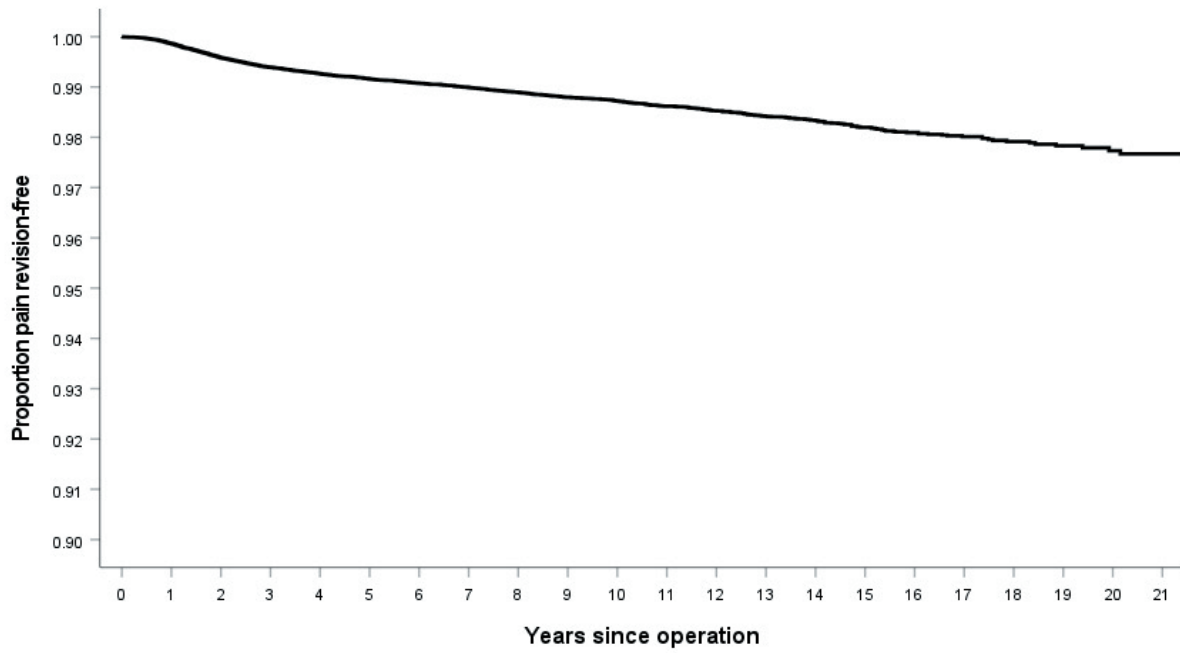


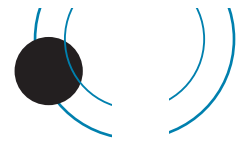


Deep infection

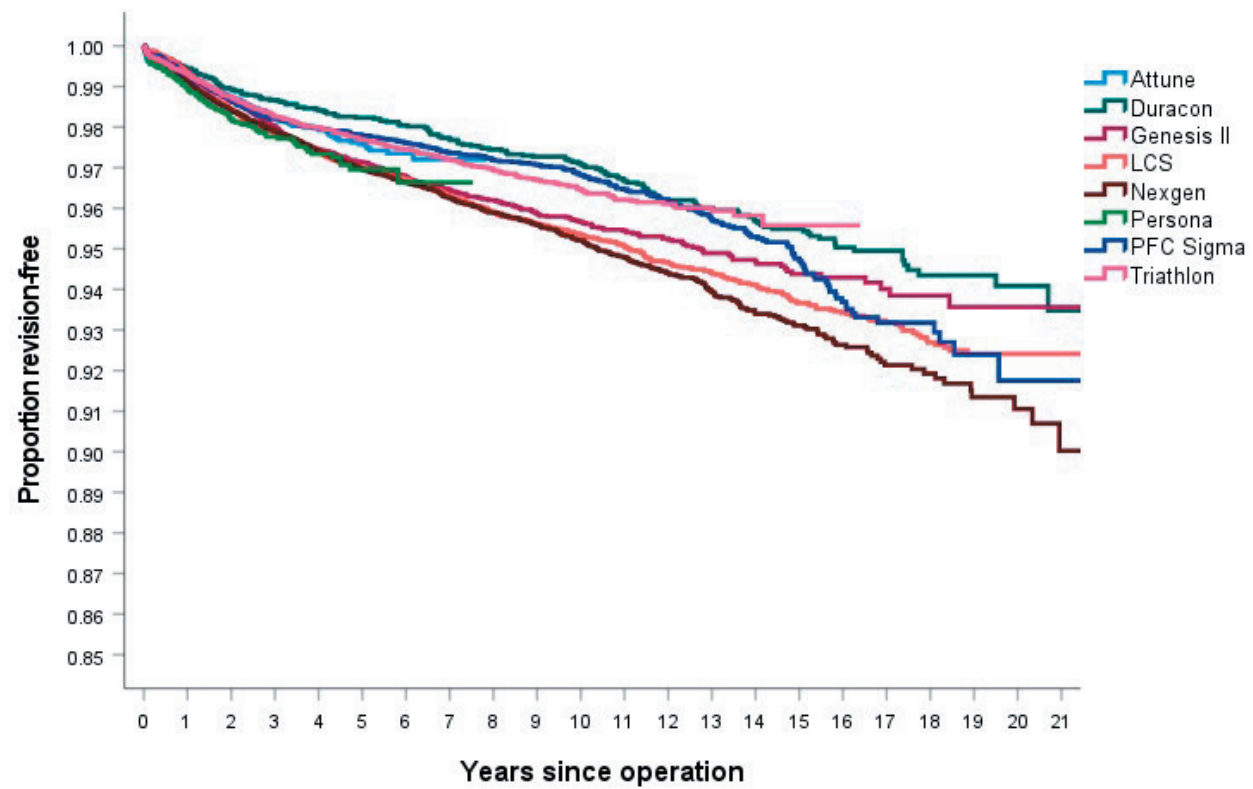


Pain





8 most common all >3500 procedures





KNEE RE-REVISIONS

Analysis was undertaken of re-revisions. There were 691 registered total knee revisions that had been revised twice, 158 that had been revised three times, 41 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 691 knee arthroplasties averaged 875 days (2.4 years), with a range of 1 – 6,241 and a standard deviation of 1,045 days. This compares to an average of 1,615 days (4.4 years) between primary and first revision knee arthroplasty.

| Reason for revision | |
|------------------------------|-----|
| Deep infection | 349 |
| Pain | 139 |
| Loosening tibial component | 93 |
| Loosening femoral component | 79 |
| Loosening patellar component | 11 |
| Fracture femur | 5 |
| 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 | |
|-----------------------------|--------------------------|-------------------------------|--------------------------|-------------------------------|------|
| 4,421 | 23,486.2 | 691 | 2.94 | 2.73 | 3.17 |

Third revision

There were 158 registered.

Fourth revision

There were 41 registered.

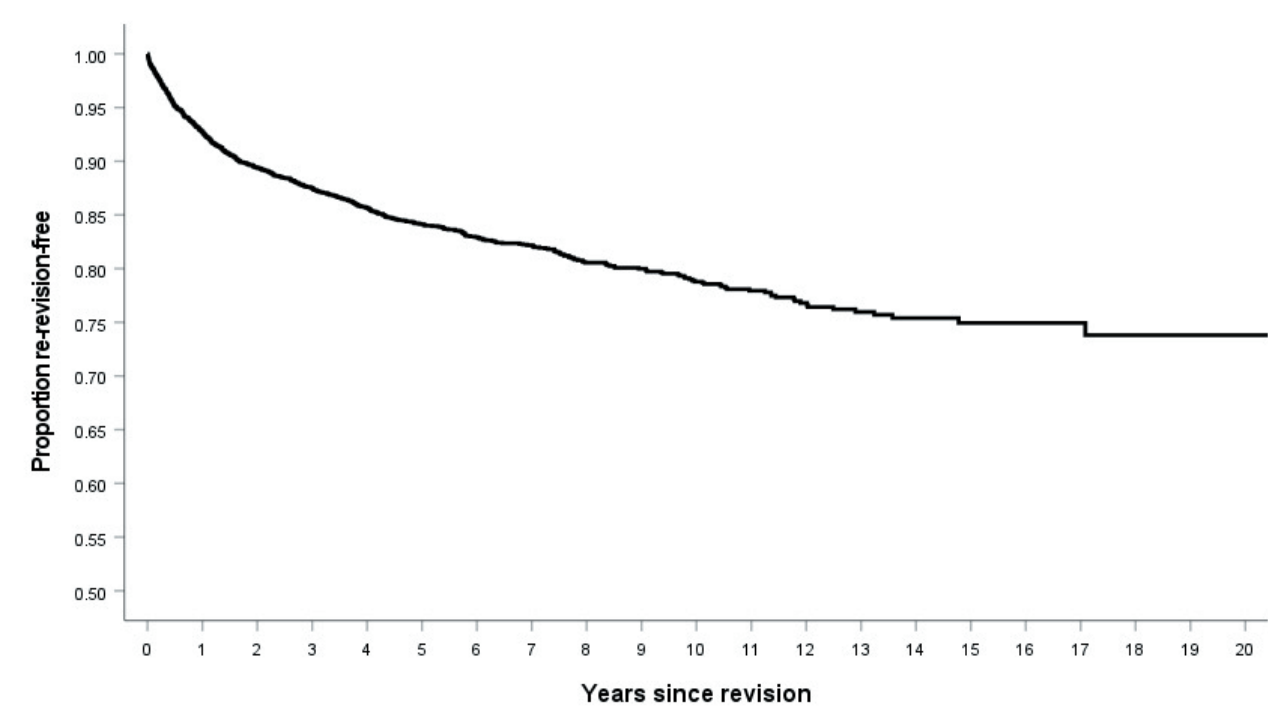
Fifth revision

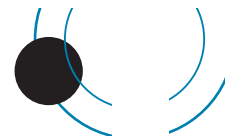
There were 12 registered.

Sixth revision

There were 4 registered.

KAPLAN MEIER SURVIVAL CURVE FOR FIRST REVISION KNEE ARTHROPLASTIES





| Years | % Re-revision free | Lower 95% | Upper 95% | Number in year |
|-------|--------------------|-----------|-----------|----------------|
| 1 | 92.72 | 91.93 | 93.51 | 3,659 |
| 2 | 89.43 | 88.48 | 90.38 | 3,162 |
| 3 | 87.52 | 86.48 | 88.56 | 2,739 |
| 4 | 85.67 | 84.54 | 86.79 | 2,327 |
| 5 | 84.14 | 82.94 | 85.35 | 1,944 |
| 6 | 82.95 | 81.67 | 84.22 | 1,605 |
| 7 | 82.18 | 80.86 | 83.51 | 1,341 |
| 8 | 80.56 | 79.11 | 82.01 | 1,090 |
| 9 | 80.00 | 78.50 | 81.50 | 909 |
| 10 | 78.79 | 77.17 | 80.42 | 720 |
| 11 | 77.95 | 76.22 | 79.67 | 555 |
| 12 | 76.80 | 74.91 | 78.70 | 416 |
| 13 | 75.97 | 73.92 | 78.02 | 299 |
| 14 | 75.41 | 73.23 | 77.58 | 214 |
| 15 | 74.95 | 72.60 | 77.29 | 158 |

New form data has the revision/reoperation procedures combined on the same form.

This analysis is for the revision/reoperation knee form.

Re-operation knee- new form data

Re-operation index 1

N = 4

If Re-operation only

| | |
|---------------------------------------|---|
| Debridement/lavage for deep infection | 1 |
| Manipulation under anaesthetic | 2 |
| Superficial wound procedure | - |
| ORIF periprosthetic fracture | 1 |
| Other – arthrolysis | 1 |

Approach

| | |
|---------------------------|---|
| Medial parapatellar | 3 |
| Lateral parapatellar | 1 |
| Tibial tubercle osteotomy | - |

Surgical adjuncts

| | |
|---------------------------------|---|
| Computer navigation | - |
| Robotic assisted | - |
| Patient specific cutting guides | - |

Operating Theatre

| | |
|-------------------------|---|
| Conventional | 3 |
| Laminar flow or similar | 1 |

Surgeon Attire

| | |
|------------------------|---|
| Space suits/Helmet fan | - |
| One piece toga | - |
| Sterile hood and gown | - |
| Conventional gown | 3 |

Re-operation index 2

There are no revision index 2 re-operations registered.

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 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-two year period and as at July 2021, there were 31,852 primary knee questionnaire responses registered at six months post-surgery.

The average knee score was 37.68 (standard deviation 7.99, range 48 – 0).

| | | |
|---------|---------|--------|
| Scoring | > 41 | 12,481 |
| Scoring | 34 – 41 | 11,294 |
| Scoring | 27 – 33 | 4,771 |
| Scoring | < 27 | 3,306 |

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 13,453 individual patients.

At five years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.60.

Questionnaires at ten years post-surgery

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

This dataset represents sequential Oxford knee scores for 7,937 individual patients.

At ten years post-surgery, 82% of patients achieved an excellent or good score and had an average of 40.12.

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 2,926 individual patients.

At fifteen years post-surgery, 79% of patients achieved an excellent or good score and had an average of 39.46.

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 746 individual patients.

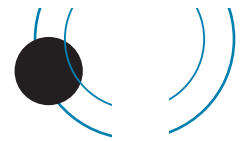
At twenty years post-surgery, 77% of patients achieved an excellent or good score and had an average of 38.69.

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 | 39.76 | 0.20 | 1,257 |
| 25 - 29 | 39.25 | 0.12 | 3,709 |
| 30 - 39 | 37.82 | 0.11 | 4,601 |
| 40+ | 35.89 | 0.29 | 741 |
| Total | 38.44 | 0.07 | 10,324 |

Revision knee questionnaire responses

There were 5,286 revision knee responses with 54% achieving an excellent or good score. This group includes all revision knee procedures. The average revision knee score was 33 (standard deviation 10.14, range 2 – 48).

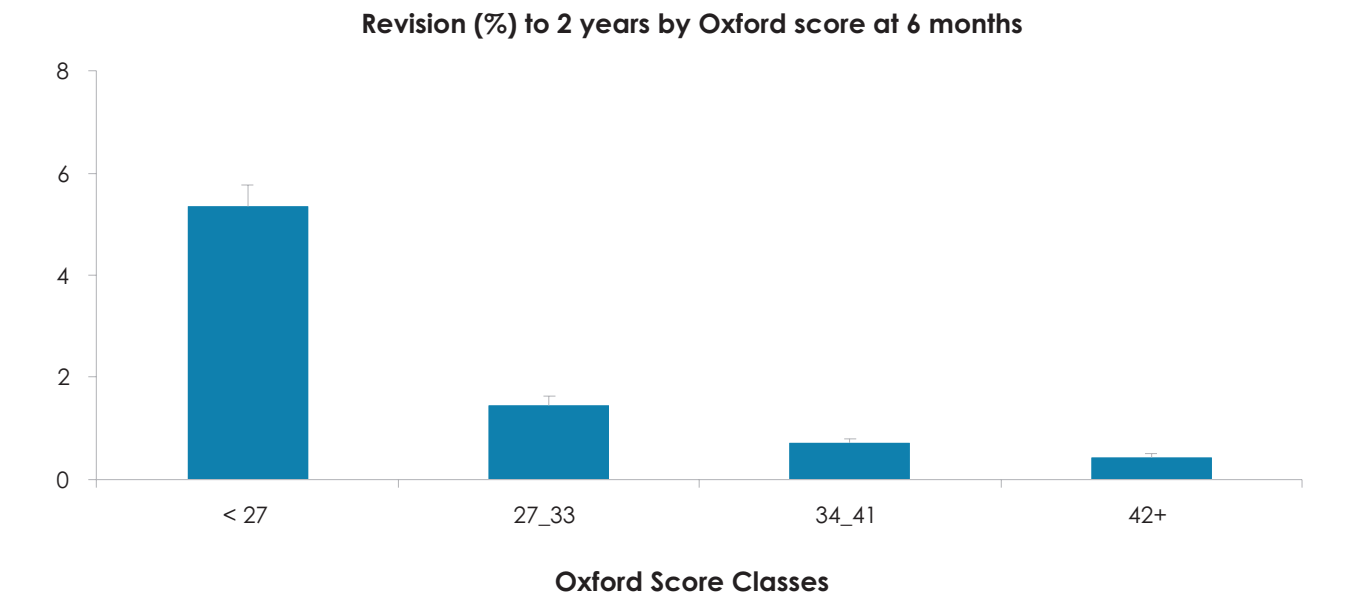


OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

A statistically significant relationship has been confirmed between the Oxford scores at six months, five, ten and fifteen 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 13 times the risk of a revision within two years compared to a person with a score >42.

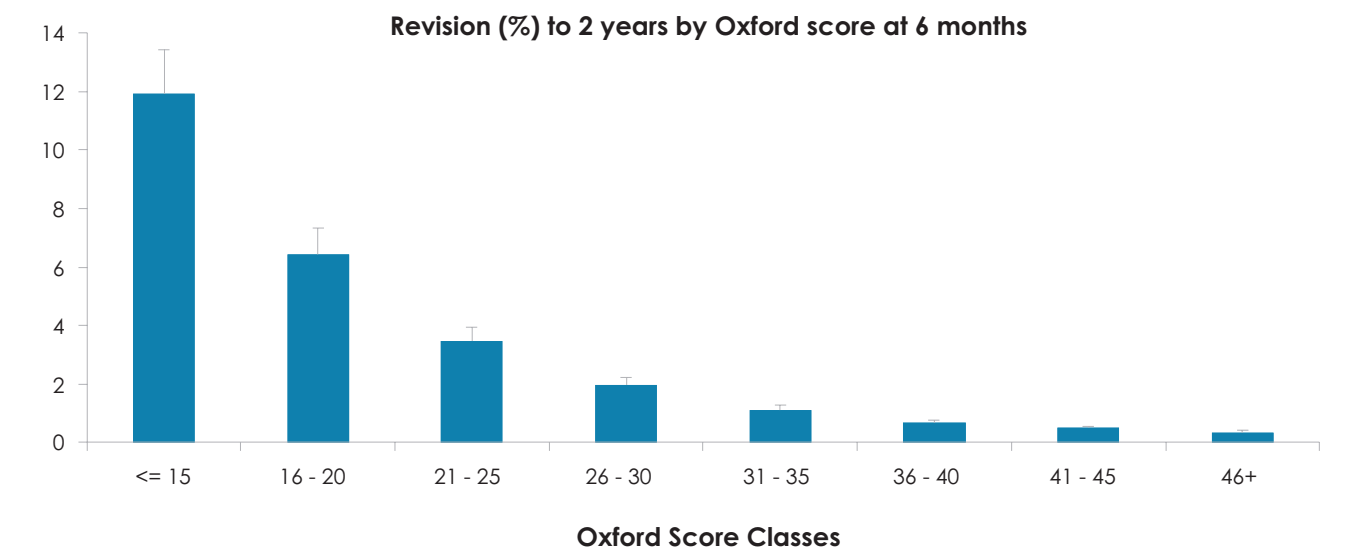


Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date

| Score group | Revision to 2 years | Number revised | % | Standard error |
|-------------|---------------------|----------------|------|----------------|
| < 27 | 2,989 | 161 | 5.39 | 0.41 |
| 27_33 | 4,284 | 62 | 1.45 | 0.18 |
| 34_41 | 10,090 | 71 | 0.70 | 0.08 |
| 42+ | 11,169 | 47 | 0.42 | 0.06 |

A person with an Oxford score > 42 has a 0.42 risk of revision within two years compared to a 5.39% 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.

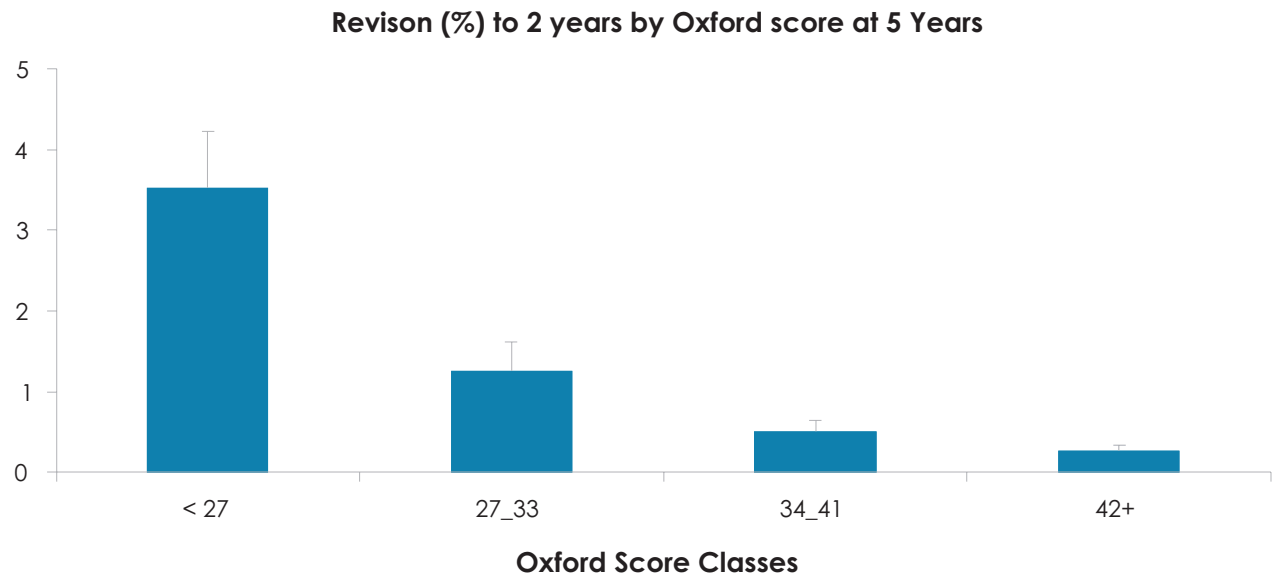


Revision risk versus groupings of Oxford scores within two years of the 6 month score date



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

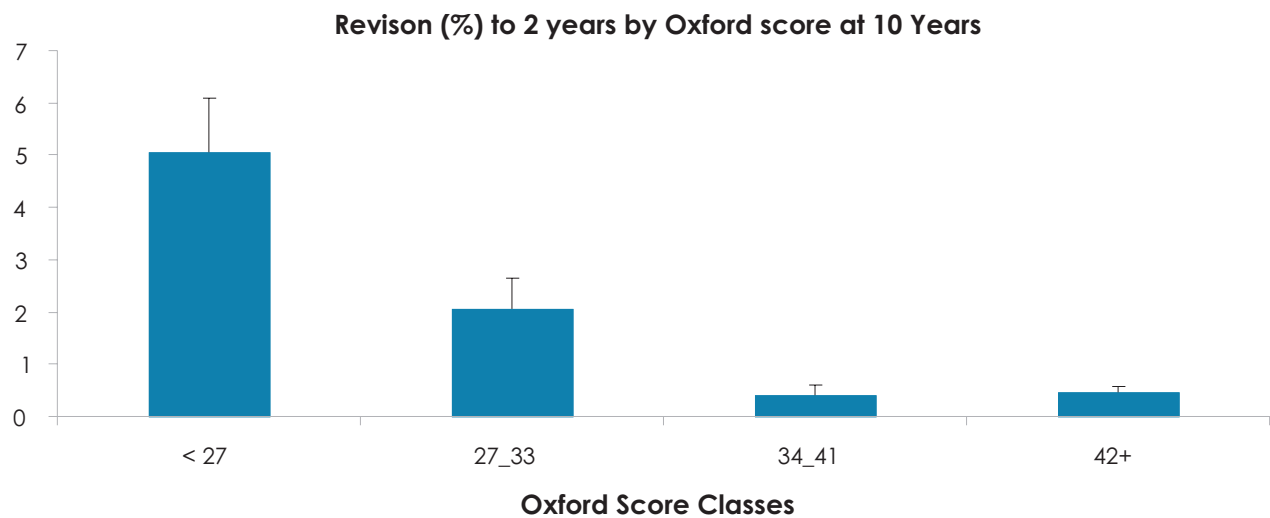


Revision risk versus Kalairajah groupings of Oxford scores within two years of the five year score date.

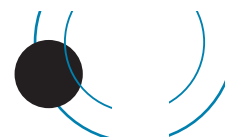
| Score group | Revision to 2 years | Number revised | % | Standard error |
|-------------|---------------------|----------------|------|----------------|
| < 27 | 738 | 25 | 3.39 | 0.67 |
| 27_33 | 994 | 12 | 1.21 | 0.35 |
| 34_41 | 2,729 | 14 | 0.51 | 0.14 |
| 42+ | 6,534 | 18 | 0.28 | 0.06 |

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 11 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 | 455 | 23 | 5.05 | 1.03 |
| 27_33 | 581 | 12 | 2.07 | 0.59 |
| 34_41 | 1,431 | 6 | 0.42 | 0.17 |
| 42+ | 3,269 | 15 | 0.46 | 0.12 |

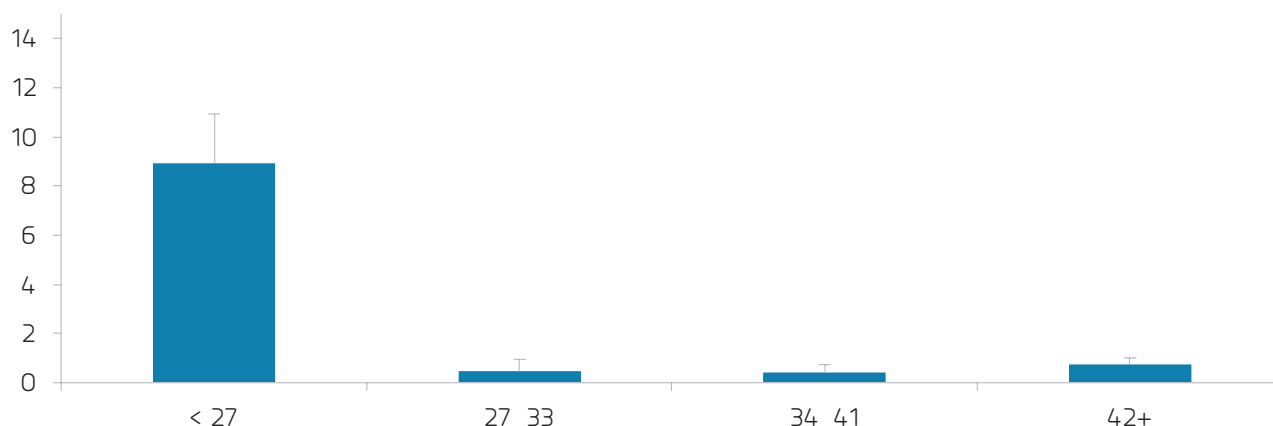
A patient with a score below 27 has 11 times the risk of a revision within two years compared to a person with a score >42.

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 12 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 | 202 | 18 | 8.91 | 2.00 |
| 27_33 | 212 | 1 | 0.47 | 0.47 |
| 34_41 | 475 | 2 | 0.42 | 0.30 |
| 42+ | 1,083 | 8 | 0.74 | 0.26 |

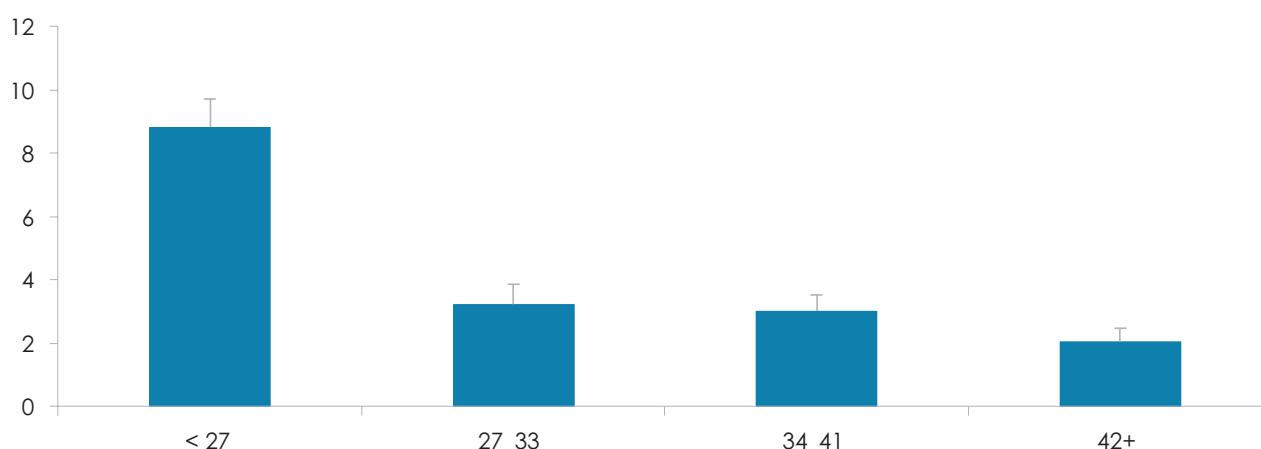
Revision (%) to 2 years - by Oxford score at 15 Years



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.

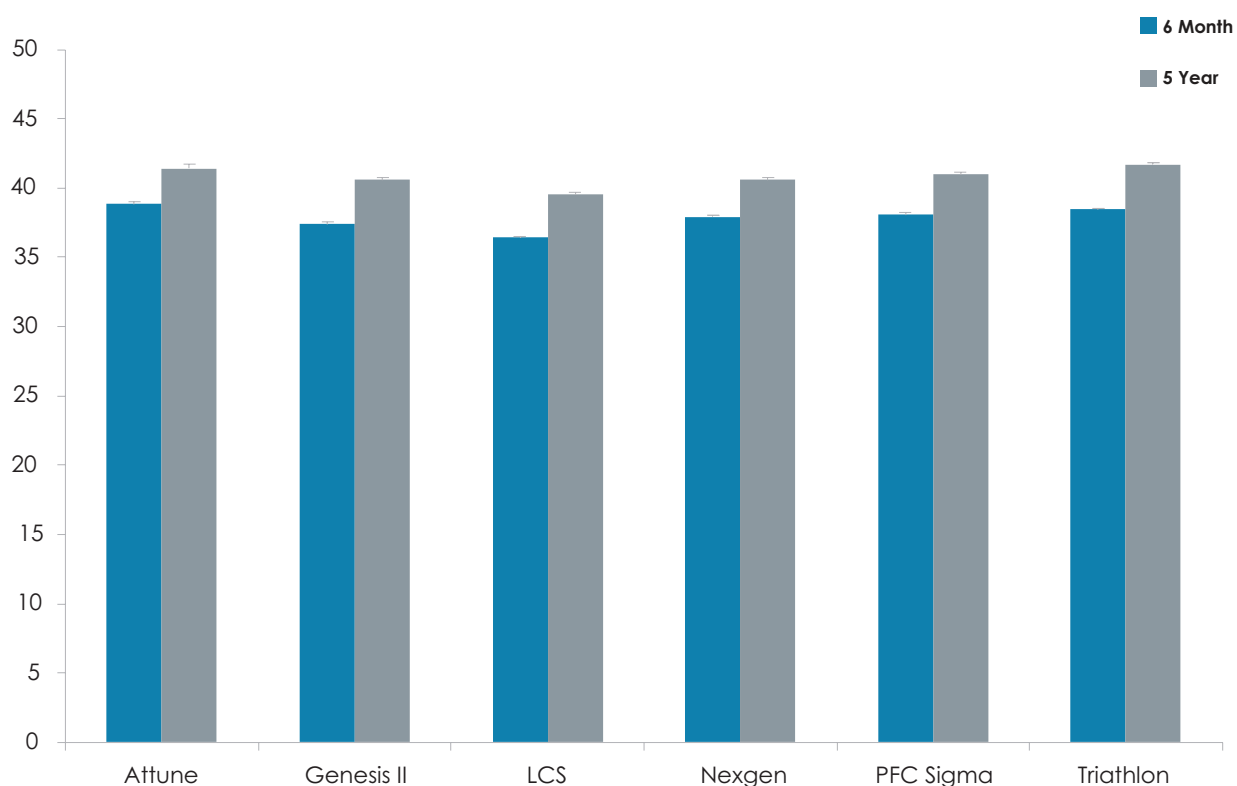
Revision (%) to 2 years by Oxford score at Revision



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

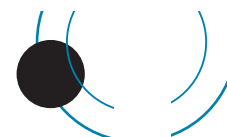
| Score group | Revision to 2 years | Number revised | % | Standard error |
|-------------|---------------------|----------------|------|----------------|
| < 27 | 1,021 | 90 | 8.81 | 0.89 |
| 27_33 | 780 | 25 | 3.21 | 0.63 |
| 34_41 | 1,226 | 37 | 3.02 | 0.49 |
| 42+ | 1,034 | 21 | 2.03 | 0.44 |

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



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

| Oxford Score | | Prosthesis | | | | | |
|--------------|--------------------|------------|------------|-------|--------|-----------|-----------|
| | | 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 | 0.13 | 0.14 | 0.11 | 0.11 | 0.14 | 0.11 |
| | Number | 2,981 | 3,541 | 5,744 | 5,120 | 2,989 | 5,081 |
| 5 Year | Mean | 41.4 | 40.6 | 39.5 | 40.6 | 41.0 | 41.7 |
| | Std. Error of Mean | 0.33 | 0.17 | 0.16 | 0.16 | 0.18 | 0.16 |
| | Number | 496 | 1,818 | 2,598 | 2,520 | 1,635 | 2,051 |



UNICOMPARTMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The data analysis is for the period **twenty-one year** period January 2000 – December 2020.

There were 14,730 unicompartmental knee procedures registered.

For the 2020 year the Oxford uncemented medial UKR remains the most commonly used prosthesis with 685 (64%), followed by the Persona Partial cemented 131 (13%) and Zimmer UK 85 (8%). Smaller numbers of Restoris 67 (6%), Journey 15, Oxford cemented 22, Sigma 15, Triathlon PKR 9 and Link Sled 5 are also being implanted.

Data Analysis

This includes new form and legacy data.

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 | 6,686 | 8,044 |
| Percentage | 45.39 | 54.61 |
| Mean age | 65.90 | 66.68 |
| Maximum age | 94.71 | 94.55 |
| Minimum age | 18.28 | 30.98 |
| Standard dev. | 10.14 | 9.20 |

Body Mass Index

For the eleven-year period 2010 - 2020, there were 7,534 BMI registrations for unicompartmental knee replacements. The average was 30.04 with a range of 15 – 60 and a standard deviation of 5.02.

Previous operation

| | |
|---|--------|
| None | 12,038 |
| Meniscectomy | 2,089 |
| Ligament reconstruction | 90 |
| Osteotomy | 56 |
| Internal fixation for juxtaarticular fracture | 39 |
| Synovectomy | 5 |

Diagnosis

| | |
|--|--------|
| Osteoarthritis | 14,435 |
| Avascular necrosis | 123 |
| Post ligament- disruption/reconstruction | 67 |
| Rheumatoid arthritis/other inflammatory | 52 |
| Post fracture | 34 |
| Tumour | 2 |

Approach

| | |
|----------------------|--------|
| Medial parapatellar | 11,153 |
| Lateral parapatellar | 301 |

Surgical adjuncts

| | |
|---------------------------------|-----|
| Computer navigation | 295 |
| Robotic assisted | 136 |
| Patient specific cutting guides | 1 |

Systemic antibiotic prophylaxis

| | |
|---|------------|
| Patient number receiving at least one systemic antibiotic | 14,730 97% |
|---|------------|

Operating theatre

| | |
|--------------|--------|
| Conventional | 10,064 |
| Laminar flow | 4,505 |

Surgeon Attire

| | |
|------------------------|-------|
| Space Suits/Helmet Fan | 3,508 |
| One-piece Toga | 19 |
| Sterile Hood and Gown | 2 |
| Conventional Gown | 71 |

ASA Class

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

For the sixteen- year period 2005 – 2020, there were 11,804 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 | 2,141 | 18 |
| 2 | 7,577 | 64 |
| 3 | 2,058 | 17 |
| 4 | 28 | 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 sixteen- year period 2005 – 2020.

| | |
|-------------------------------|--------|
| Consultant | 11,524 |
| Advanced trainee supervised | 549 |
| Advanced trainee unsupervised | 92 |
| Basic trainee | 16 |

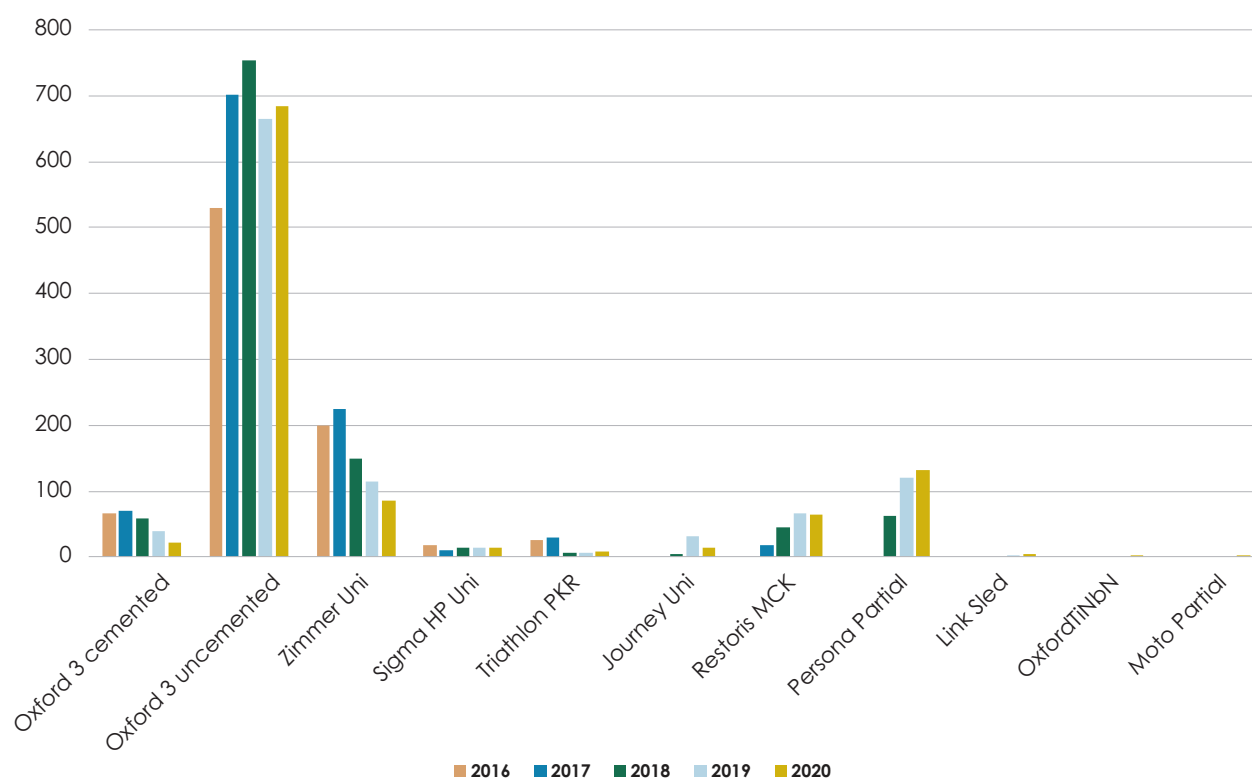
Prosthesis usage

Unicompartmental knee prostheses used in 2020

| | |
|---------------------|-----|
| Oxford 3 uncemented | 685 |
| Persona Partial | 131 |
| Zimmer Uni | 85 |
| Restoris MCK | 65 |
| Oxford 3 cemented | 22 |
| Sigma HP Uni | 15 |
| Journey Uni | 15 |
| Triathlon PKR | 9 |
| Link Sled | 5 |
| Oxford TiNbn coated | 1 |
| Moto Partial Knee | 1 |



Most used Unicompartmental prostheses for 5 years (2016 – 2020)



Surgeon and hospital workload

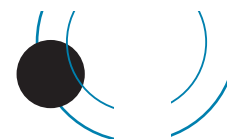
Surgeons

In 2020, 81 surgeons performed 1,034 unicompartmental knee replacements, an average of 13 procedures per surgeon.

40 surgeons performed less than 10 procedures and 41 surgeons performed greater or equal to 10 procedures.

Hospitals

In 2020, unicompartmental knee replacements were performed in 40 hospitals; 20 were public and 20 were private.



REVISION OF REGISTERED PRIMARY UNICOMPARTMENTAL ARTHROPLASTIES

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

There were 1,245 revisions of the 14,730 registered unicompartmental knee replacements.

A further 136 had a second revision, 19 a third revision, 1 a fourth revision and 1 a fifth revision.

999 of the 1,245 were revised to total knee replacements and 246 a further revision to unicompartmental knees.

Of the implants that were in common use in 2020, 206 (192 in 2019) medial Oxford UKR were revised (0.77/100 ocys), 47 (40 in 2019), Zimmer UKR (0.52/100 ocys), 14 (12 in 2019), Triathlon PKR (0.96/100 ocys) and 34 (27 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.

Of the 105 revised cases this year, unexplained pain remains the most common stated reason (25%), tibial loosening (14%), femoral loosening (8%) and tibial fracture (3%).

Time to revision

| | |
|--------------------|--------------------|
| Average | 2,201 days 6 years |
| Maximum | 7,257 days |
| Minimum | 1 day |
| Standard deviation | 1,809 days |

Reason for revision

| | |
|----------------------------|-----|
| Unexplained pain | 367 |
| Loosening tibial component | 206 |
| Loosening femoral | 144 |
| Deep infection | 50 |
| Fracture tibia | 31 |
| 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

| Years | Loosening femoral component | | Loosening tibial component | | Pain | |
|--------------|-----------------------------|------|----------------------------|------|------------|------|
| | Count | % | Count | % | Count | % |
| 0 | 13 | 9.0 | 36 | 17.5 | 48 | 13.1 |
| 1 | 25 | 17.4 | 40 | 19.4 | 83 | 22.6 |
| 2 | 9 | 6.3 | 15 | 7.3 | 40 | 10.9 |
| 3 | 16 | 11.1 | 15 | 7.3 | 18 | 4.9 |
| 4 | 5 | 3.5 | 10 | 4.9 | 32 | 8.7 |
| 5 | 11 | 7.6 | 9 | 4.4 | 18 | 4.9 |
| 6 | 5 | 3.5 | 13 | 6.3 | 21 | 5.7 |
| 7 | 11 | 7.6 | 9 | 4.4 | 18 | 4.9 |
| 8 | 9 | 6.3 | 8 | 3.9 | 14 | 3.8 |
| 9 | 6 | 4.2 | 12 | 5.8 | 15 | 4.1 |
| 10 | 8 | 5.6 | 6 | 2.9 | 15 | 4.1 |
| 11+ | 26 | 18.1 | 33 | 16.0 | 45 | 12.3 |
| Total | 144 | | 206 | | 367 | |

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.



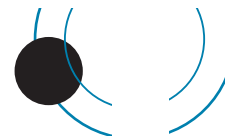
All Primary Unicompartmental Knee Arthroplasties

| No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| 14,730 | 108,240 | 1,245 | 1.15 | 1.09 | 1.22 |

Revision Rate of Individual Unicompartmental Knee Prostheses Sorted Alphabetically

| Femur Prosthesis | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|--------------------------|---------|--------------------------|----------------|--------------------------|-------------------------------|----------|
| EIUS Uni Knee | 22 | 262.8 | 2 | 0.76 | 0.09 | 2.75 |
| Freedom Active Uni | 36 | 236.2 | 8 | 3.39 | 1.46 | 6.67 |
| Genesis Uni | 359 | 4,161.3 | 54 | 1.30 | 0.96 | 1.68 |
| HLS Uni Evolution | 1 | 0.5 | 1 | 193.25 | 4.89 | 1,076.74 |
| Journey Uni | 58 | 100.2 | 3 | 2.99 | 0.62 | 8.75 |
| LCS Uni | 6 | 64.0 | 2 | 3.12 | 0.38 | 11.29 |
| Link Sled | 7 | 4.2 | 0 | 0.00 | 0.00 | 88.12 |
| Miller/Galante | 710 | 8,868.0 | 89 | 1.00 | 0.80 | 1.23 |
| Moto Partial Knee | 1 | 0.1 | 0 | 0.00 | 0.00 | 3,062.19 |
| Optetrak Uni Cemented | 101 | 988.1 | 11 | 1.11 | 0.52 | 1.93 |
| Oxford 3 cemented | 4,201 | 45,343 | 624 | 1.38 | 1.27 | 1.49 |
| Oxford 3 uncemented | 5,966 | 28,686.0 | 240 | 0.84 | 0.00 | 0.95 |
| Oxford TiNbn coated | 2 | 9.9 | 0 | 0.00 | 0.00 | 37.43 |
| Oxinium Uni | 33 | 315.9 | 12 | 3.80 | 1.96 | 6.64 |
| Persona Partial cemented | 313 | 384.2 | 4 | 1.04 | 0.22 | 2.48 |
| Preservation | 484 | 5,636.0 | 98 | 1.74 | 1.41 | 2.12 |
| Repicci II | 98 | 1,288.6 | 26 | 2.02 | 1.32 | 2.96 |
| Restoris MCK | 203 | 309.0 | 2 | 0.65 | 0.03 | 2.34 |
| Sigma HP Uni | 189 | 977.6 | 5 | 0.51 | 0.17 | 1.19 |
| Triathlon PKR | 248 | 1,455.9 | 14 | 0.96 | 0.53 | 1.61 |
| Unix Uni | 14 | 106.4 | 3 | 2.82 | 0.58 | 8.24 |
| Zimmer Uni Knee | 1,678 | 9,042.6 | 47 | 0.52 | 0.38 | 0.68 |

| Oxford 3 uncemented | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|------------------------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| Not lateral domed | 5,636 | 26,740.21 | 206 | 0.77 | 0.67 | 0.88 |
| Oxford 3 lateral domed | 330 | 1,945.76 | 34 | 1.75 | 1.21 | 2.44 |



Revision vs Arthroplasty Fixation

| Fixation | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|------------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| Cemented | 8,662 | 78,951.9 | 996 | 1.26 | 1.18 | 1.34 |
| Uncemented | 5,454 | 25,819.8 | 198 | 0.77 | 0.66 | 0.88 |
| Hybrid | 614 | 3,468.6 | 51 | 1.47 | 1.08 | 1.92 |

Revision vs Age Bands

| Age Bands | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|-----------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| <55 | 1,888 | 14,094.1 | 260 | 1.84 | 1.63 | 2.08 |
| 55-64 | 4,986 | 38,837.3 | 559 | 1.44 | 1.32 | 1.56 |
| 65-74 | 5,004 | 37,088.3 | 306 | 0.83 | 0.73 | 0.92 |
| >=75 | 2,852 | 18,220.6 | 120 | 0.66 | 0.55 | 0.8 |

Revision vs Gender

| Gender | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|--------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| F | 6,686 | 50,736.3 | 634 | 1.25 | 1.15 | 1.35 |
| M | 8,044 | 57,504.0 | 611 | 1.06 | 0.98 | 1.15 |

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 | 5,645 | 46,612.1 | 624 | 1.34 | 1.24 | 1.45 |
| >=10 | 9,083 | 61,614.8 | 620 | 1.01 | 0.93 | 1.09 |

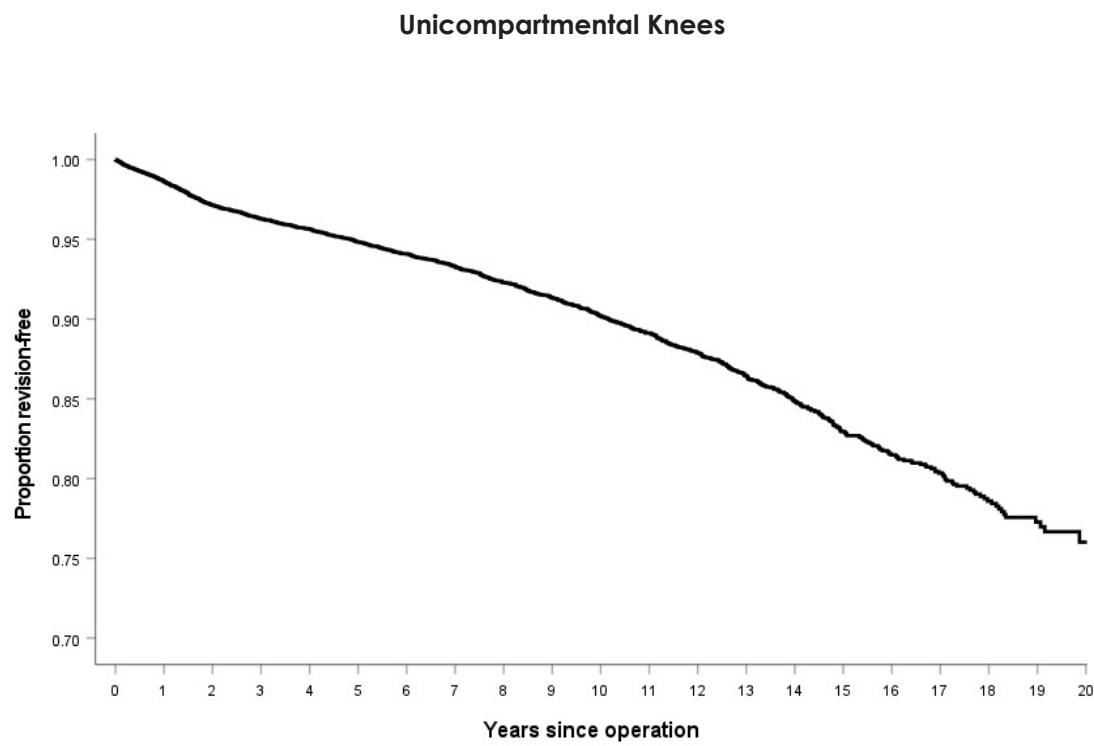
Revision vs Surgical Approach

| Approach | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|----------------------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| Medial parapatellar | 11,153 | 81,848.3 | 990 | 1.21 | 1.14 | 1.29 |
| Lateral parapatellar | 301 | 2,364.1 | 38 | 1.61 | 1.14 | 2.21 |

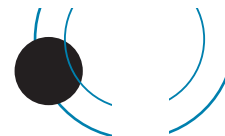


KAPLAN MEIER CURVES

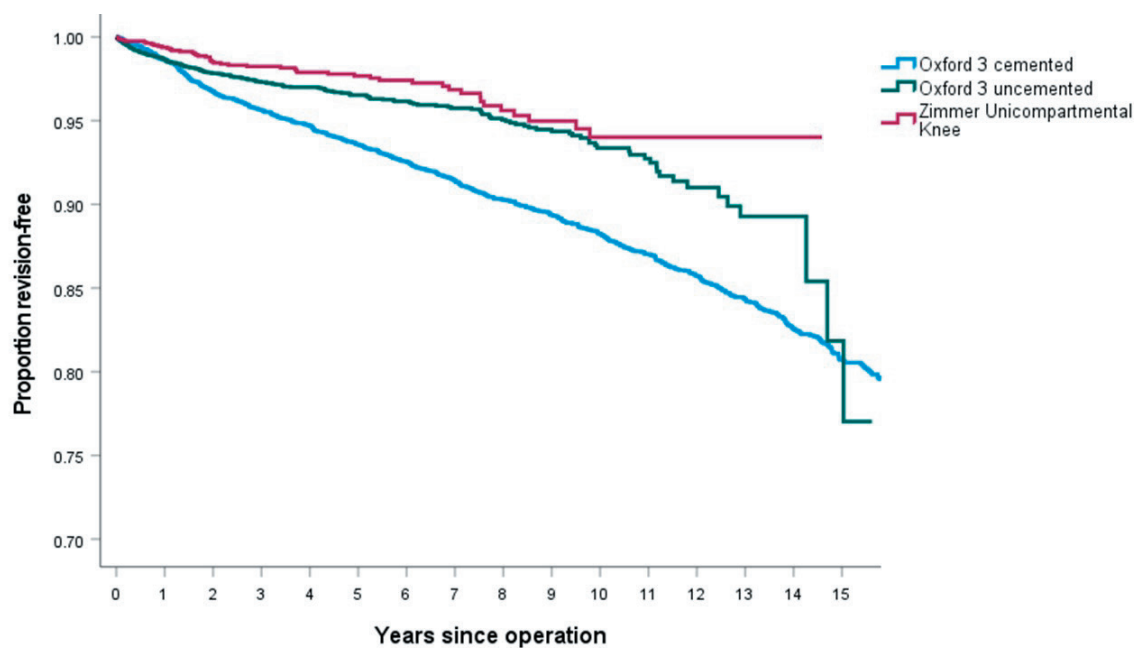
The following Kaplan Meier survival analyses are for the 21 years from 2000 to 2020, with deceased patients censored at time of death.



| Years | % Revision-free | Number |
|-------|-----------------|--------|
| 1 | 98.6 | 13,450 |
| 2 | 97.2 | 12,116 |
| 3 | 96.3 | 10,829 |
| 4 | 95.7 | 9,617 |
| 5 | 94.8 | 8,616 |
| 6 | 94.1 | 7,662 |
| 7 | 93.3 | 6,821 |
| 8 | 92.3 | 5,967 |
| 9 | 91.3 | 5,169 |
| 10 | 90.2 | 4,494 |
| 11 | 89.1 | 3,810 |
| 12 | 87.9 | 3,178 |
| 13 | 86.5 | 2,648 |
| 14 | 84.9 | 2,122 |
| 15 | 83.0 | 1,630 |
| 16 | 81.5 | 1,222 |
| 17 | 80.4 | 834 |
| 18 | 78.6 | 520 |
| 19 | 77.3 | 268 |
| 20 | 76.0 | 105 |

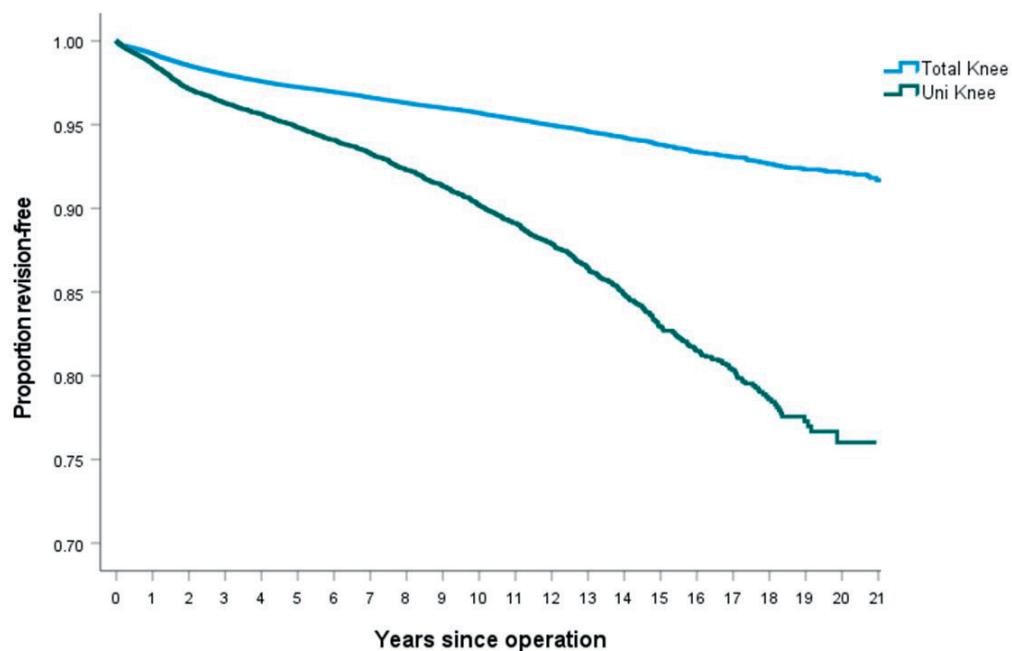


Survival curves for the 3 unicompartmental knees with the biggest number of implantations excluding lateral domed Oxford 3 uncemented



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 | 999 | 6,373.8 | 74 | 1.16 | 0.91 | 1.46 |
| Revised to Uni | 246 | 1,169.9 | 62 | 5.30 | 4.06 | 6.79 |
| All | 1,245 | 7,543.7 | 136 | 1.80 | 1.51 | 2.13 |



| | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|-------------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| Total Knees | 126,603 | 934,868.1 | 4,421 | 0.47 | 0.46 | 0.49 |
| Uni Knees | 14,730 | 108,249.3 | 1,245 | 1.15 | 1.09 | 1.22 |

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

Questionnaires at six months post-surgery

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

There are 12 questions, with the scores ranging from 48 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 2021, there were 9,308 unicompartamental knee questionnaire responses registered at six months post-surgery.

The average unicompartamental knee score was 39.90 (standard deviation 7.17, range 3 – 48).

| | |
|-----------------|-------|
| Scoring > 41 | 4,845 |
| Scoring 34 - 41 | 2,943 |
| Scoring 27- 33 | 959 |
| Scoring < 27 | 552 |

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 3,781 individual patients.

At five years post-surgery, 88% of patients achieved an excellent or good score and had an average of 41.70.

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 2,092 individual patients.

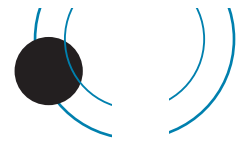
At ten years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.81.

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 691 individual patients.

At fifteen years post-surgery, 84% of patients achieved an excellent or good score and had an average of 40.46.



OXFORD 12 SCORE AS A PREDICTOR OF UNICOMPARTMENTAL 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 (%) to 2 years by Oxford score at 6 months



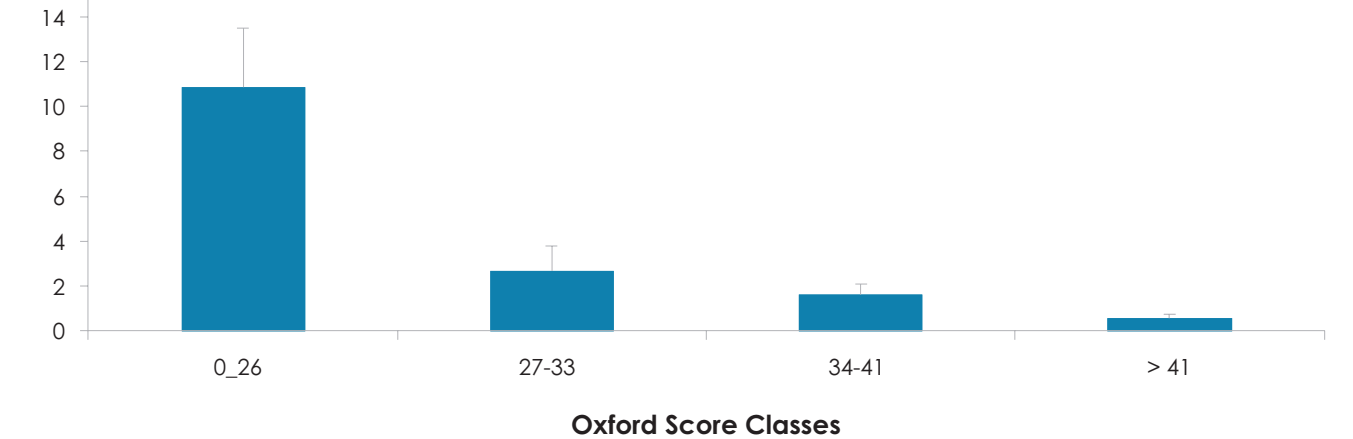
Revision risk versus Kalairajah groupings of Oxford scores within two years of the six month score date

| Kalairajah group | Revision to 2 years | Number revised | % | Standard error |
|------------------|---------------------|----------------|-------|----------------|
| 0-26 | 459 | 86 | 18.74 | 1.82 |
| 27-33 | 812 | 35 | 4.31 | 0.71 |
| 34-41 | 2,467 | 31 | 1.26 | 0.22 |
| > 41 | 3,990 | 37 | 0.93 | 0.15 |

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

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



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

| Kalairajah group | Revision to 2 years | Number revised | % | Standard error |
|------------------|---------------------|----------------|-------|----------------|
| 0-26 | 138 | 15 | 10.87 | 2.65 |
| 27-33 | 223 | 6 | 2.69 | 1.08 |
| 34-41 | 733 | 12 | 1.64 | 0.47 |
| > 41 | 2,061 | 12 | 0.58 | 0.17 |

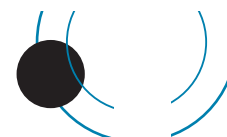
Ten year score and revision arthroplasty

Plotting the patients' ten scores in the Kalairajah groupings against the proportion of knees revised for that same group demonstrates that there is an incremental increase in risk during the next two years related to the Oxford score. A patient with a score below 27 has 11 times the risk of a revision within two years compared to a person with a score of >41.



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

| Kalairajah group | Revision to 2 years | Number revised | % | Standard error |
|------------------|---------------------|----------------|-------|----------------|
| 0-26 | 111 | 15 | 13.51 | 3.24 |
| 27-33 | 139 | 6 | 4.32 | 1.72 |
| 34-41 | 347 | 8 | 2.31 | 0.81 |
| > 41 | 954 | 12 | 1.26 | 0.36 |



ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **twenty-one year** report analyses data for the period January 2000 – December 2020. There were 1,877 primary ankle procedures registered.

Data analysis includes new form and legacy data.

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 | 739 | 1,138 |
| Percentage | 39.37 | 60.63 |
| Mean age | 64.55 | 67.96 |
| Maximum age | 95.52 | 91.78 |
| Minimum age | 32.32 | 33.42 |
| Standard dev. | 9.80 | 8.42 |

Body Mass Index

For the eleven- year period 2010 - 2020, there were 827 BMI registrations for primary ankle replacements. The average was 29 with a range of 17 – 54 and a standard deviation of 4.72.

Previous operation

| | |
|---|-------|
| None | 1,505 |
| Internal fixation for juxta- articular fracture | 178 |
| Arthrodesis | 48 |
| Osteotomy | 25 |

Diagnosis

| | |
|---|-------|
| Osteoarthritis | 1,426 |
| Rheumatoid arthritis/other inflammatory | 162 |
| Avascular necrosis | 7 |
| Post fracture | 1 |
| Instability | 1 |

X-Ray

| | |
|------------------------------|---|
| Concentric or mild deformity | 3 |
| >10 degrees varus | 2 |
| >10 degrees valgus | 1 |

Concurrent surgery

| | |
|-----------------------------------|---|
| Achilles or calf lengthening | 4 |
| Ligament reconstruction – lateral | 1 |
| Midfoot fusion or osteotomy | 1 |

Approach

| | |
|----------------------------------|-------|
| Anterior | 1,571 |
| Lateral | 5 |
| Patient specific instrumentation | 2 |

Systemic antibiotic prophylaxis

| | |
|---|-------|
| Patient number receiving at least one systemic antibiotic | 1,813 |
|---|-------|

Operating theatre

| | |
|--------------|-----|
| Conventional | 940 |
| Laminar flow | 919 |

Surgeon Attire

| | |
|------------------------|-----|
| Space suits/Helmet Fan | 353 |
| One piece Toga | 1 |
| Sterile Hood and Gown | 1 |
| Conventional gown | 5 |

ASA Class

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

For the sixteen- year period 2005 -2020, there were 1,599 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 | 282 |
| 2 | 992 |
| 3 | 319 |
| 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 sixteen-year period 2005 -2020.

| | |
|-----------------------------|-------|
| Consultant | 1,719 |
| Advanced trainee supervised | 15 |

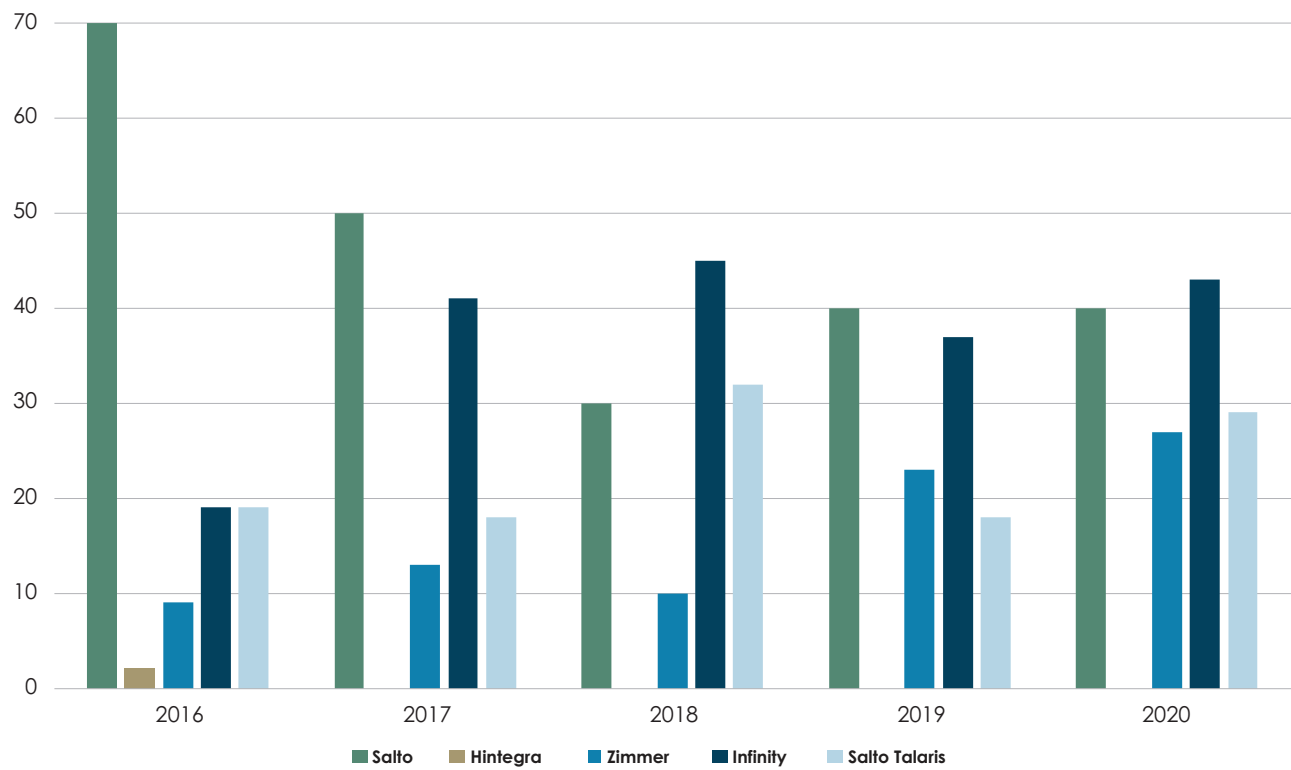
Prosthesis usage

Ankle prostheses used in 2020

| | |
|---------------|----|
| Infinity | 43 |
| Salto | 40 |
| Salto Talaris | 29 |
| Zimmer TM | 27 |



MOST USED ANKLE PROSTHESES 2016 – 2020



Surgeon and hospital workload

Surgeons

In 2020, 23 surgeons performed 139 primary ankle procedures. 5 surgeons performed >= 10 procedures and 18 performed <10 procedures.

Hospitals

In 2020, primary ankle replacement was performed in 17 hospitals. 12 were public and 5 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.

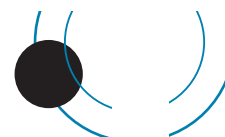
Procedures where all components are removed (e.g. ankle fusion post failed ankle replacement or removal of components and insertion of a cement spacer for infection), are all recorded as revisions. It does not include soft tissue procedures or bony debridement without component changes.

Data Analysis

For the twenty-one year period January 2000–December 2020, there were 265 revision ankle procedures registered.

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

| | Female | Male |
|---------------|--------|-------|
| Number | 105 | 160 |
| Percentage | 39.62 | 60.38 |
| Mean | 64.08 | 67.05 |
| Maximum age | 81.68 | 85.43 |
| Minimum age | 42.13 | 34.55 |
| Standard dev. | 8.95 | 8.27 |



REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

This section analyses data for revisions of primary ankle procedures for the **twenty-one year** period 2000 – 2020.

There were 206 revisions of the primary total ankle procedures of 1,877.

Time to revision

| | |
|--------------------|------------------------|
| Average | 1,748 days (4.8 years) |
| Maximum | 5,173 days |
| Minimum | 21 days |
| Standard deviation | 1,267 days |

Reason for revision

| | |
|----------------------------|----|
| Pain | 89 |
| Loosening talar component | 60 |
| Loosening tibial component | 44 |
| Deep infection | 19 |
| Dislocation | 4 |
| Fracture talus | 3 |

Ankle re-revisions

There were 23 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

| Years | Loosening talar component | | Loosening tibial component | | Pain | | Deep Infection | |
|--------------|---------------------------|------|----------------------------|------|-----------|------|----------------|------|
| | Count | % | Count | % | Count | % | Count | % |
| 0 | 3 | 5.0 | 3 | 6.8 | 5 | 5.6 | 8 | 42.1 |
| 1 | 7 | 11.7 | 13 | 29.5 | 16 | 18.0 | 3 | 15.8 |
| 2 | 8 | 13.3 | 3 | 6.8 | 11 | 12.4 | 2 | 10.5 |
| 3 | 9 | 15.0 | 3 | 6.8 | 11 | 12.4 | 2 | 10.5 |
| 4 | 9 | 15.0 | 5 | 11.4 | 14 | 15.7 | 1 | 5.3 |
| 5 | 4 | 6.7 | 1 | 2.3 | 6 | 6.7 | 0 | 0.0 |
| 6 | 4 | 6.7 | 3 | 6.8 | 5 | 5.6 | 0 | 0.0 |
| 7 | 3 | 5.0 | 2 | 4.5 | 5 | 5.6 | 1 | 5.3 |
| 8 | 2 | 3.3 | 4 | 9.1 | 5 | 5.6 | 0 | 0.0 |
| 9 | 4 | 6.7 | 2 | 4.5 | 4 | 4.5 | 0 | 0.0 |
| 10 | 2 | 3.3 | 2 | 4.5 | 3 | 3.4 | 0 | 0.0 |
| 11+ | 5 | 8.3 | 3 | 6.8 | 4 | 4.5 | 2 | 10.5 |
| Total | 60 | | 44 | | 89 | | 19 | |

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 | |
|----------|--------------------|----------------|--------------------------|-------------------------------|------|
| 1,877 | 12,710.9 | 206 | 1.62 | 1.41 | 1.86 |



Revision vs Prosthesis Type Sorted in Alphabetical Order

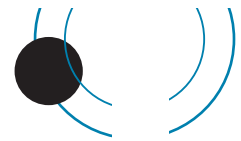
| Prosthesis | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|---------------|---------|--------------------------|----------------|--------------------------|-------------------------------|-------|
| Agility | 119 | 1,406.7 | 35 | 2.49 | 1.70 | 3.42 |
| Box | 6 | 44.5 | 2 | 4.50 | 0.54 | 16.24 |
| Hintegra | 22 | 130.9 | 4 | 3.06 | 0.65 | 7.83 |
| Infinity | 191 | 428.4 | 4 | 0.93 | 0.25 | 2.39 |
| Mobility | 450 | 4,288.6 | 70 | 1.63 | 1.27 | 2.06 |
| Ramses | 11 | 107.7 | 5 | 4.64 | 1.51 | 10.83 |
| Salto | 801 | 5,228.6 | 72 | 1.38 | 1.08 | 1.73 |
| Salto Talaris | 145 | 423.0 | 0 | 0.00 | 0.00 | 0.87 |
| STAR | 47 | 494.5 | 12 | 2.43 | 1.18 | 4.11 |
| Zimmer TM | 85 | 157.9 | 2 | 1.27 | 0.00 | 4.58 |

Revision vs Gender

| Gender | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|---------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| Females | 739 | 5,082.2 | 83 | 1.63 | 1.29 | 2.01 |
| Males | 1,138 | 7,628.7 | 123 | 1.61 | 1.34 | 1.92 |

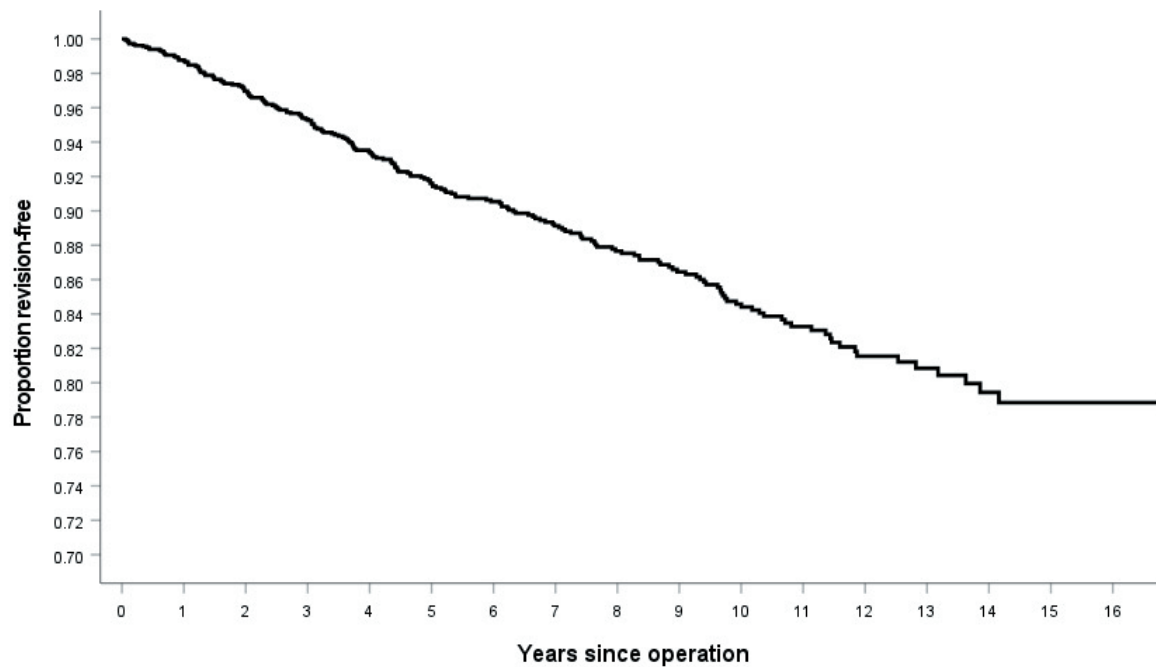
Revision vs Age Bands

| Age Bands | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|-----------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| <55 | 187 | 1,408.2 | 38 | 2.70 | 1.88 | 3.66 |
| 55-64 | 566 | 4,331.6 | 98 | 2.26 | 1.84 | 2.76 |
| 65-74 | 785 | 5,106.7 | 62 | 1.21 | 0.93 | 1.56 |
| >=75 | 339 | 1,864.5 | 8 | 0.43 | 0.17 | 0.81 |



KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 21 years from 2000 to 2020, with deceased patients censored at time of death.



| Years | % Revision-free | No in each year |
|-------|-----------------|-----------------|
| 1 | 98.8 | 1,702 |
| 2 | 97.0 | 1,546 |
| 3 | 95.3 | 1,387 |
| 4 | 93.5 | 1,224 |
| 5 | 91.6 | 1,068 |
| 6 | 90.5 | 951 |
| 7 | 89.1 | 835 |
| 8 | 87.7 | 719 |
| 9 | 86.5 | 609 |
| 10 | 84.6 | 503 |
| 11 | 83.3 | 395 |
| 12 | 81.5 | 289 |
| 13 | 80.8 | 203 |
| 14 | 79.4 | 149 |
| 15 | 78.9 | 96 |
| 16 | 78.9 | 58 |
| 17 | 78.9 | 35 |

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS POST-SURGERY

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

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

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

For the 5 year period 2016 – 2020 there were 364 responses.

Average = 18.69, Maximum = 60, Minimum = 0 and Standard deviation = 14.57.

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **twenty-one year** report analyses data for the period January 2000 – December 2020.

There were 12,615 shoulder procedures registered with n = 673 revised.

New data forms introduced in October 2020 now have 3 categories of shoulder replacement.

These are total shoulder with 4,109 registered, reverse with 6,392 registered and hemiarthroplasty with 2,114 registered.

The previous category of resurfacing head has been updated to total shoulder and partial resurfacing has been updated to hemiarthroplasty. The 1 humeral sphere has been updated to hemiarthroplasty.

Data Analysis

Data form analysis includes new form and legacy data.

Age and sex distribution

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

Total shoulder

| | Female | Male |
|---------------|--------|-------|
| Number | 2,491 | 1,618 |
| Percentage | 60.62 | 39.38 |
| Mean age | 70.17 | 65.79 |
| Maximum age | 95.43 | 89.11 |
| Minimum age | 26.64 | 23.67 |
| Standard dev. | 8.70 | 8.97 |

Reverse shoulder

| | Female | Male |
|---------------|--------|-------|
| Number | 3,980 | 2,412 |
| Percentage | 62.27 | 37.73 |
| Mean age | 75.06 | 72.18 |
| Maximum age | 96.82 | 92.65 |
| Minimum age | 35.61 | 20.61 |
| Standard dev. | 7.78 | 7.8 |

Hemiarthroplasty

| | Female | Male |
|---------------|--------|-------|
| Number | 1,293 | 821 |
| Percentage | 61.16 | 38.84 |
| Mean age | 70.17 | 62.44 |
| Maximum age | 97.71 | 99.36 |
| Minimum age | 15.02 | 20.13 |
| Standard dev. | 12.13 | 12.95 |

1. Total shoulder analysis

Previous operation

| | |
|---|-------|
| None | 3,791 |
| Rotator cuff repair | 61 |
| Previous stabilisation | 93 |
| Internal fixation for juxtaarticular fracture | 49 |

| | |
|--|----|
| Superior capsular reconstruction | - |
| Arthroscopic debridement/decompression | 30 |

Diagnosis

| | |
|---|-------|
| Osteoarthritis | 3,550 |
| Rheumatoid arthritis/other inflammatory | 261 |
| Cuff tear arthropathy | 21 |
| Massive cuff tear without arthritis | - |
| Acute fracture proximal humerus | 16 |
| Post old trauma | 125 |
| Avascular necrosis | 95 |
| Post recurrent dislocation | 68 |
| Tumour | - |

Approach

| | |
|---------------|-------|
| Deltopectoral | 3,730 |
|---------------|-------|

Systemic antibiotic prophylaxis

| | |
|---|-------|
| Patient number receiving at least one systemic antibiotic | 3,901 |
|---|-------|

Operating theatre

| | |
|--------------|-------|
| Conventional | 2,580 |
| Laminar flow | 1,472 |

ASA Class

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

For the sixteen- year period 2005 – 2020 there were 3,613 total 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 |

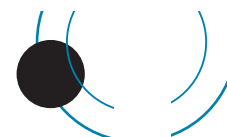
| ASA | Number | Percentage |
|-----|--------|------------|
| 1 | 400 | 11 |
| 2 | 2,209 | 61 |
| 3 | 983 | 27 |
| 4 | 21 | 1 |

Surgeon grade

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

The following figures are for the sixteen-year period 2005 – 2020 and are for total shoulder procedures.

| | |
|-------------------------------|-------|
| Consultant | 3,579 |
| Advanced trainee supervised | 165 |
| Advanced trainee unsupervised | 6 |
| Basic trainee | - |



Surgeon and hospital workload

Surgeons

In 2020, 55 surgeons performed 271 total shoulder procedures, an average of 5 procedures per surgeon.

7 surgeons performed ≥ 10 and 48 surgeons performed <10 total shoulder procedures.

Hospitals

In 2020, total shoulder replacement was performed in 41 hospitals. 23 were public and 18 were private.

2. Reverse shoulder analysis

Previous operation

| | |
|---|-------|
| None | 5,152 |
| Rotator cuff repair | 786 |
| Previous stabilization | 92 |
| Internal fixation for juxtaarticular fracture | 138 |
| Superior capsular reconstruction | 1 |
| Athrosopic debridement/decompression | 39 |

Diagnosis

| | |
|---|-------|
| Osteoarthritis | 2,328 |
| Rheumatoid arthritis/other inflammatory | 356 |
| Cuff tear arthropathy | 2,808 |
| Massive cuff tear without arthritis | 5 |
| Acute fracture proximal humerus | 651 |
| Post old trauma | 351 |
| Avascular necrosis | 116 |
| Post recurrent dislocation | 67 |
| Tumour | - |

Approach

| | |
|---------------|-------|
| Deltopectoral | 5,473 |
|---------------|-------|

Systemic antibiotic prophylaxis

| | |
|---|-------|
| Patient number receiving at least one systemic antibiotic | 6,085 |
|---|-------|

Operating theatre

| | |
|--------------|-------|
| Conventional | 3,436 |
| Laminar flow | 2,677 |

ASA Class

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

For the sixteen- year period 2005 – 2020 there were 6,233 reverse 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 | 343 | 6 |
| 2 | 3,247 | 55 |
| 3 | 2,370 | 38 |
| 4 | 93 | 1 |

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the sixteen-year period 2005 – 2020 and are for reverse shoulder procedures.

| | |
|-------------------------------|-------|
| Consultant | 6,033 |
| Advanced trainee supervised | 345 |
| Advanced trainee unsupervised | 9 |
| Basic trainee | 5 |

Surgeon and hospital workload

Surgeons

In 2020, 76 surgeons performed n = 873 reverse shoulder procedures, an average of 11 procedures per surgeon. 34 surgeons performed ≥ 10 and 42 surgeons performed <10 total shoulder procedures.

Hospitals

In 2020, reverse shoulder replacement was performed in 46 hospitals. 25 were public and 21 were private.

3. Hemiarthroplasty shoulder analysis

Previous operation

| | |
|---|-------|
| None | 1,696 |
| Rotator cuff repair | 68 |
| Previous stabilisation | 67 |
| Internal fixation for juxtaarticular fracture | 92 |
| Superior capsular reconstruction | - |
| Athrosopic debridement/decompression | 13 |

Diagnosis

| | |
|---|-----|
| Osteoarthritis | 830 |
| Rheumatoid arthritis/other inflammatory | 223 |
| Cuff tear arthropathy | 215 |
| Massive cuff tear without arthritis | - |
| Acute fracture proximal humerus | 476 |
| Post old trauma | 208 |
| Avascular necrosis | 130 |
| Post recurrent dislocation | 58 |
| Tumour | - |

Approach

| | |
|---------------|-------|
| Deltopectoral | 1,881 |
|---------------|-------|

Systemic antibiotic prophylaxis

| | |
|---|-------|
| Patient number receiving at least one systemic antibiotic | 1,955 |
|---|-------|

Operating theatre

| | |
|--------------|-------|
| Conventional | 1,473 |
| Laminar flow | 612 |

ASA Class

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

For the sixteen- year period 2005 – 2020 there were 1,457 hemiarthroplasty 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 | 185 | 13 |
| 2 | 757 | 52 |
| 3 | 500 | 34 |
| 4 | 15 | 1 |

Surgeon grade

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

The following figures are for the sixteen-year period 2005 – 2020 and are for hemiarthroplasty shoulder procedures.

| | |
|-------------------------------|-------|
| Consultant | 1,482 |
| Advanced trainee supervised | 62 |
| Advanced trainee unsupervised | 12 |
| Basic trainee | 1 |

Surgeon and hospital workload

Surgeons

In 2020, 16 surgeons performed n = 30 hemiarthroplasty shoulder procedures.

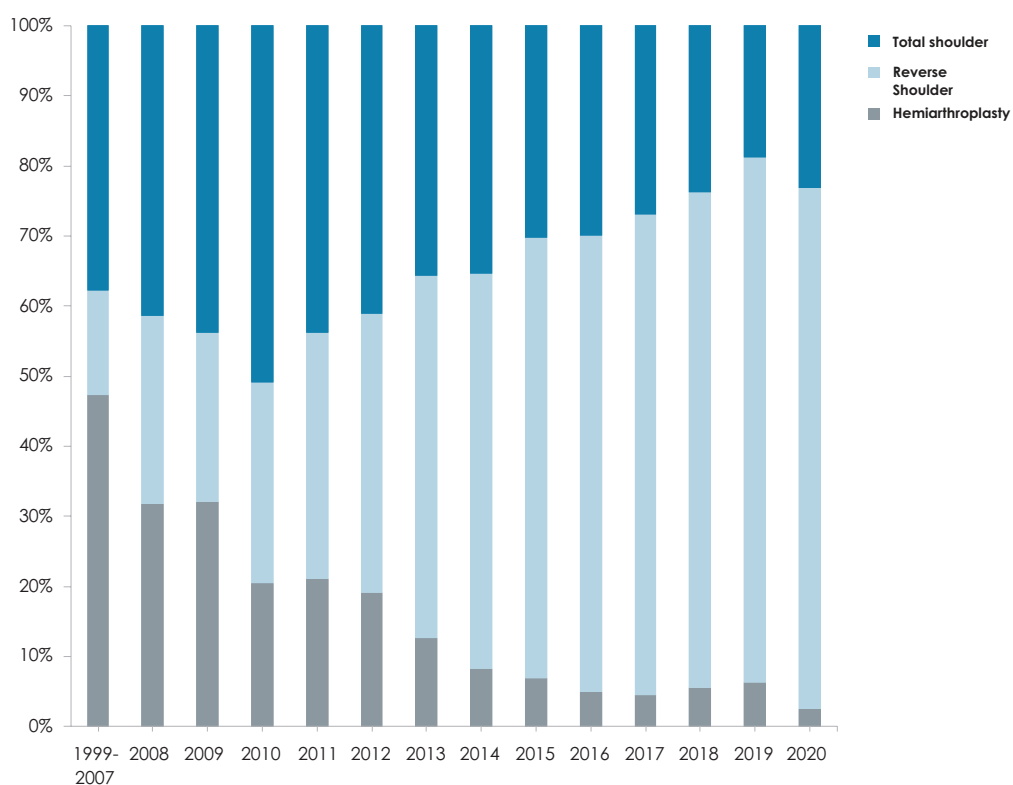
Hospitals

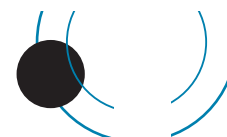
In 2020, hemiarthroplasty shoulder replacement was performed in 16 hospitals. 10 were public and 6 were private.

Operative time (skin to skin in minutes)

| | Mean |
|------------------|------|
| Total shoulder | 126 |
| Reverse shoulder | 110 |
| Hemiarthroplasty | 108 |

Percentages of the different types of shoulder prostheses used by year





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.

Procedures where all components are removed (e.g. Girdlestone, ankle fusion post failed ankle replacement, or removal of components and insertion of a cement spacer for infection) are all recorded as revisions.

Data Analysis

For the twenty-one year period January 2000 – December 2020 there were 1,006 revision shoulder procedures registered.

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

| | Female | Male |
|---------------|--------|-------|
| Number | 576 | 430 |
| Percentage | 57.26 | 42.74 |
| Mean | 70.22 | 67.11 |
| Maximum age | 89.95 | 88.46 |
| Minimum age | 33.20 | 24.05 |
| Standard dev. | 10.09 | 10.21 |

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

This section analyses data for revisions of total shoulder procedures for the twenty-one year period January 2000 – December 2020.

There were 267 revisions of the total shoulder group of 4,109, 192 revisions of the reverse shoulder group of 6,392 and 214 revisions of the hemiarthroplasty group of 2,114.

For the total shoulder group there were 39 procedures that had been revised twice and 9 procedures that had been revised three times.

Time to revision – all shoulders

| | |
|--------------------|------------------------|
| Average | 1,520 days (4.2 years) |
| Maximum | 6,269 days |
| Minimum | 7 days |
| Standard deviation | 1,390 days |

Reason for revision – total shoulders n = 267

| | |
|----------------------------------|----|
| Deep infection | 11 |
| Loosening glenoid | 61 |
| Loosening humeral | 5 |
| Dislocation/instability anterior | 36 |
| Instability posterior | 8 |
| Rotator cuff impingement | - |
| Fracture humerus | 3 |
| Implant breakage/dissociation | - |
| Glenoid erosion | - |
| Pain | 30 |
| Loosening both | 12 |

Reason for revision- reverse shoulders n = 192

| | |
|----------------------------------|----|
| Deep infection | 44 |
| Loosening glenoid | 38 |
| Loosening humeral | 13 |
| Dislocation/instability anterior | 45 |
| Instability posterior | 5 |
| Rotator cuff impingement | - |
| Fracture humerus | 9 |
| Implant breakage/dissociation | - |
| Glenoid erosion | - |
| Pain | 20 |
| Loosening both | 4 |

Reason for revision – hemiarthroplasty n = 214

| | |
|----------------------------------|----|
| Deep infection | 13 |
| Loosening humeral | 10 |
| Dislocation/instability anterior | 14 |
| Instability posterior | 4 |
| Rotator cuff impingement | - |
| Fracture humerus | 5 |
| Implant breakage/dissociation | - |
| Pain | 82 |

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

| | Loosening glenoid | | Dislocation | | Deep infection | | Pain | | Loosening Humeral | |
|--------------|-------------------|------|-------------|------|----------------|------|------------|------|-------------------|------|
| Year | Count | % | Count | % | Count | % | Count | % | Count | % |
| 0 | 24 | 23.3 | 55 | 57.9 | 23 | 33.8 | 26 | 19.7 | 6 | 21.4 |
| 1 | 17 | 16.5 | 15 | 15.8 | 15 | 22.1 | 29 | 22.0 | 3 | 10.7 |
| 2 | 10 | 9.7 | 4 | 4.2 | 10 | 14.7 | 21 | 15.9 | 4 | 14.3 |
| 3 | 5 | 4.9 | 2 | 2.1 | 6 | 8.8 | 9 | 6.8 | 3 | 10.7 |
| 4 | 7 | 6.8 | 4 | 4.2 | 4 | 5.9 | 12 | 9.1 | 2 | 7.1 |
| 5 | 5 | 4.9 | 5 | 5.3 | 2 | 2.9 | 6 | 4.5 | 3 | 10.7 |
| 6 | 4 | 3.9 | 2 | 2.1 | 1 | 1.5 | 4 | 3.0 | 0 | 0.0 |
| 7 | 2 | 1.9 | 3 | 3.2 | 1 | 1.5 | 7 | 5.3 | 0 | 0.0 |
| 8 | 2 | 1.9 | 3 | 3.2 | 3 | 4.4 | 3 | 2.3 | 2 | 7.1 |
| 9 | 10 | 9.7 | 0 | 0.0 | 0 | 0.0 | 6 | 4.5 | 3 | 10.7 |
| 10 | 6 | 5.8 | 1 | 1.1 | 0 | 0.0 | 2 | 1.5 | 1 | 3.6 |
| 11+ | 11 | 10.7 | 1 | 1.1 | 3 | 4.4 | 7 | 5.3 | 1 | 3.6 |
| Total | 103 | | 95 | | 68 | | 132 | | 28 | |

Statistical note

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

i) Observed component years

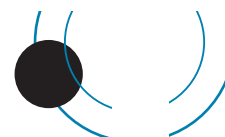
This is the number of registered primary procedures multiplied by the number of years each component has been in place.

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 (CI's) 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 | |
|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| 12,615 | 71,988.2 | 673 | 0.94 | 0.87 | 1.01 |

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 | 4,109 | 27,957.8 | 267 | 0.95 | 0.84 | 1.08 |
| Reverse | 6,392 | 26,226.1 | 192 | 0.73 | 0.63 | 0.84 |
| Hemi | 2,114 | 17,804.3 | 214 | 1.20 | 1.04 | 1.37 |

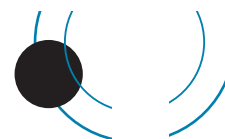
There is a significantly higher revision rate for Partial Resurfacing compared to all the other types.

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 | |
|----------------|------------------------|---------|--------------------|----------------|--------------------------|-------------------------------|---------|
| Hemi | Aequalis | 142 | 1,355.1 | 15 | 1.11 | 0.62 | 1.83 |
| | Aequalis Ascend Flex | 157 | 458.9 | 2 | 0.44 | 0.05 | 1.57 |
| | Aequalis Reverse II | 1 | 2.4 | 0 | 0.00 | 0.00 | 153.46 |
| | Affinis | 1 | 1.7 | 0 | 0.00 | 0.00 | 215.92 |
| | Affinis Short stem | 13 | 48.0 | 1 | 2.08 | 0.05 | 11.60 |
| | Anatomical | 19 | 264.0 | 0 | 0.00 | 0.00 | 1.40 |
| | Arthrex Eclipse | 3 | 26.3 | 0 | 0.00 | 0.00 | 14.03 |
| | Arthrex Univers | 1 | 0.5 | 0 | 0.00 | 0.00 | 761.22 |
| | Arthrex Univers Revers | 1 | 0.2 | 0 | 0.00 | 0.00 | 1,566.7 |
| | Ascend TM | 1 | 6.9 | 0 | 0.00 | 0.00 | 53.62 |
| | Bi-Angular | 19 | 230.6 | 2 | 0.87 | 0.11 | 3.13 |
| | Bigliani/Flatow | 137 | 1,473.0 | 15 | 1.02 | 0.57 | 1.68 |
| | Bio-modular | 1 | 7.1 | 1 | 14.00 | 0.35 | 78.03 |
| | Cofield 2 | 50 | 615.5 | 1 | 0.16 | 0.00 | 0.91 |
| | Comprehensive | 3 | 9.3 | 0 | 0.00 | 0.00 | 39.86 |
| | Delta | 1 | 8.8 | 0 | 0.00 | 0.00 | 42.08 |
| | Delta Xtend Reverse | 31 | 145.3 | 4 | 2.75 | 0.75 | 7.05 |
| | Epoca Humeral stem | 1 | 6.8 | 0 | 0.00 | 0.00 | 54.39 |
| | Global | 723 | 7,142.0 | 60 | 0.84 | 0.64 | 1.08 |
| | Global AP | 96 | 599.0 | 6 | 1.00 | 0.32 | 2.06 |
| | Global Icon | 1 | 2.8 | 0 | 0.00 | 0.00 | 130.69 |
| | Global Unite | 65 | 251.8 | 13 | 5.16 | 2.75 | 8.83 |
| | Latitude | 1 | 0.1 | 0 | 0.00 | 0.00 | 4,082.9 |
| | MRS Humeral | 4 | 20.9 | 0 | 0.00 | 0.00 | 17.61 |
| | Neer II | 24 | 265.4 | 0 | 0.00 | 0.00 | 1.39 |



| Operation Type | Prosthesis | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|------------------|--------------------------------|---------|--------------------|----------------|--------------------------|-------------------------------|---------|
| Hemi, continued | Osteonics humeral component | 42 | 401.0 | 2 | 0.50 | 0.06 | 1.80 |
| | Randelli | 1 | 8.2 | 0 | 0.00 | 0.00 | 44.82 |
| | Simpliciti TM | 3 | 7.5 | 0 | 0.00 | 0.00 | 49.44 |
| | SMR | 346 | 2,481.9 | 50 | 2.01 | 1.50 | 2.66 |
| | SMR Resurfacing | 52 | 411.6 | 13 | 3.16 | 1.68 | 5.40 |
| | SMR stemless | 1 | 2.9 | 0 | 0.00 | 0.00 | 128.2 |
| | Univers 3D | 1 | 3.8 | 0 | 0.00 | 0.00 | 96.59 |
| Reverse shoulder | Aequalis Ascend | 1 | 0.1 | 0 | 0.00 | 0.00 | 4,491.2 |
| | Aequalis Ascend Flex | 504 | 1,525.2 | 16 | 1.05 | 0.57 | 1.66 |
| | Aequalis Flex Revive | 1 | 0.0 | 0 | 0.00 | 0.00 | 9,624.0 |
| | Aequalis Reverse II | 206 | 831.7 | 6 | 0.72 | 0.26 | 1.57 |
| | Aequalis Reversed | 1 | 7.9 | 0 | 0.00 | 0.00 | 46.82 |
| | Aequalis Reversed Fracture | 64 | 217.0 | 1 | 0.46 | 0.01 | 2.57 |
| | Affinis | 1 | 0.7 | 0 | 0.00 | 0.00 | 547.71 |
| | Affinis Fracture stem | 4 | 8.0 | 1 | 12.56 | 0.32 | 70.00 |
| | Affinis Inverse | 1 | 0.2 | 0 | 0.00 | 0.00 | 2,323.0 |
| | Affinis Inverse stem | 33 | 83.9 | 2 | 2.38 | 0.29 | 8.61 |
| | Arthrex Univers | 10 | 6.0 | 0 | 0.00 | 0.00 | 61.08 |
| | Arthrex Univers Revers | 83 | 84.4 | 0 | 0.00 | 0.00 | 4.37 |
| | Comprehensive | 238 | 652.3 | 5 | 0.77 | 0.21 | 1.68 |
| | Delta | 55 | 522.6 | 2 | 0.38 | 0.05 | 1.38 |
| | Delta Xtend Reverse | 1,967 | 8,851.9 | 76 | 0.86 | 0.68 | 1.07 |
| | Equinox Humeral | 70 | 79.0 | 2 | 2.53 | 0.31 | 9.14 |
| | Flex Shoulder System | 1 | 0.3 | 0 | 0.00 | 0.00 | 1,192.4 |
| | Global Unite | 30 | 45.3 | 0 | 0.00 | 0.00 | 8.14 |
| | Humeral stem | 1 | 0.5 | 0 | 0.00 | 0.00 | 774.35 |
| | Mirai Humeral Core | 2 | 0.3 | 0 | 0.00 | 0.00 | 1,086.6 |
| | Mirai Humeral Stem | 3 | 1.0 | 0 | 0.00 | 0.00 | 353.64 |
| | Mutars | 1 | 2.6 | 0 | 0.00 | 0.00 | 144.26 |
| | RSP | 2 | 5.8 | 0 | 0.00 | 0.00 | 63.11 |
| | SMR | 2,988 | 12,927.0 | 77 | 0.60 | 0.47 | 0.74 |
| | SMR stemless | 50 | 138.7 | 2 | 1.44 | 0.08 | 5.21 |
| | Trabecular Metal Reverse | 51 | 212.4 | 2 | 0.94 | 0.11 | 3.40 |
| | Univers Revers | 21 | 8.7 | 0 | 0.00 | 0.00 | 42.45 |
| | Vaios | 1 | 9.7 | 0 | 0.00 | 0.00 | 38.03 |
| | Zimmer Trabecular Metal Should | 1 | 1.7 | 0 | 0.00 | 0.00 | 215.92 |



| Operation Type | Prosthesis | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|----------------|-----------------------------|---------|--------------------|----------------|--------------------------|-------------------------------|---------|
| Total Shoulder | Aequalis | 290 | 2,776.6 | 17 | 0.61 | 0.36 | 0.98 |
| | Aequalis Ascend Flex | 340 | 1,335.7 | 6 | 0.45 | 0.16 | 0.98 |
| | Affinis | 8 | 18.4 | 0 | 0.00 | 0.00 | 20.03 |
| | Affinis Fracture stem | 1 | 1.6 | 0 | 0.00 | 0.00 | 236.79 |
| | Affinis Short stem | 161 | 320.1 | 3 | 0.94 | 0.19 | 2.74 |
| | Anatomical | 35 | 497.7 | 2 | 0.40 | 0.05 | 1.45 |
| | Arthrex Eclipse | 15 | 29.4 | 0 | 0.00 | 0.00 | 12.55 |
| | Arthrex Univers | 5 | 4.3 | 0 | 0.00 | 0.00 | 86.76 |
| | Arthrex Univers Revers | 1 | 0.2 | 0 | 0.00 | 0.00 | 2,105.3 |
| | Ascend TM | 2 | 12.4 | 0 | 0.00 | 0.00 | 29.76 |
| | Bi-Angular | 8 | 86.5 | 0 | 0.00 | 0.00 | 4.27 |
| | Bigliani/Flatow | 307 | 3,104.5 | 11 | 0.35 | 0.18 | 0.63 |
| | Cofield 2 | 21 | 253.3 | 0 | 0.00 | 0.00 | 1.46 |
| | Comprehensive | 63 | 184.5 | 4 | 2.17 | 0.59 | 5.55 |
| | Custom device | 1 | 0.9 | 0 | 0.00 | 0.00 | 426.38 |
| | Delta Xtend Reverse | 4 | 0.4 | 0 | 0.00 | 0.00 | 949.09 |
| | Epoca Humeral stem | 4 | 38.1 | 0 | 0.00 | 0.00 | 9.69 |
| | Equinox Humeral | 12 | 14.7 | 1 | 6.79 | 0.17 | 37.83 |
| | Global | 519 | 5,265.8 | 29 | 0.55 | 0.37 | 0.79 |
| | Global AP | 525 | 3,463.7 | 12 | 0.35 | 0.17 | 0.59 |
| | Global Icon | 11 | 17.5 | 2 | 11.45 | 0.62 | 41.37 |
| | Global Unite | 252 | 812.9 | 9 | 1.11 | 0.51 | 2.10 |
| | Humeral stem | 1 | 8.2 | 0 | 0.00 | 0.00 | 44.72 |
| | Mirai Humeral Core | 18 | 6.8 | 0 | 0.00 | 0.00 | 54.31 |
| | Mirai Humeral Stem | 1 | 0.6 | 0 | 0.00 | 0.00 | 654.06 |
| | MUTARS | 1 | 0.2 | 0 | 0.00 | 0.00 | 1,749.8 |
| | Neer 3 | 2 | 30.4 | 0 | 0.00 | 0.00 | 12.13 |
| | Neer II | 12 | 161.7 | 1 | 0.62 | 0.02 | 3.45 |
| | Osteonics humeral component | 49 | 546.3 | 7 | 1.28 | 0.52 | 2.64 |
| | Sidus | 1 | 6.3 | 0 | 0.00 | 0.00 | 58.30 |
| | Simpliciti TM | 84 | 211.6 | 2 | 0.95 | 0.11 | 3.41 |
| | SMR | 1,033 | 7,168.3 | 147 | 2.05 | 1.73 | 2.41 |
| | SMR Resurfacing | 3 | 21.5 | 1 | 4.65 | 0.12 | 25.89 |
| | SMR stemless | 117 | 273.3 | 6 | 2.20 | 0.81 | 4.78 |
| | Trabecular Metal Reverse | 1 | 10.5 | 0 | 0.00 | 0.00 | 35.23 |
| | Univers 3D | 5 | 43.8 | 0 | 0.00 | 0.00 | 8.43 |
| | Univers Apex | 16 | 13.3 | 0 | 0.00 | 0.00 | 27.65 |



| Operation Type | Prosthesis | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|---------------------------|----------------|---------|--------------------|----------------|--------------------------|-------------------------------|--------|
| Total Shoulder, continued | Univers II | 1 | 1.6 | 1 | 62.87 | 1.59 | 350.27 |
| | Univers Revers | 3 | 1.3 | 0 | 0.00 | 0.00 | 291.64 |

Revision vs Glenoid Fixation
(Conventional Total arthroplasties only)

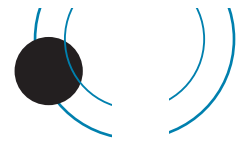
| | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|------------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| Uncemented | 1,159 | 8,050.8 | 151 | 1.88 | 1.58 | 2.19 |
| Cemented | 2,950 | 19,906.9 | 116 | 0.58 | 0.48 | 0.70 |

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 | 299 | 1,655.5 | 34 | 2.05 | 1.40 | 2.83 |
| | 55-64 | 1,042 | 6,931.0 | 96 | 1.39 | 1.12 | 1.68 |
| | 65-74 | 1,785 | 12,582.2 | 102 | 0.81 | 0.66 | 0.98 |
| | >=75 | 983 | 67,989.1 | 35 | 0.52 | 0.36 | 0.72 |
| Reverse | <55 | 91 | 264.1 | 4 | 1.51 | 0.41 | 3.88 |
| | 55-64 | 752 | 2,908.1 | 42 | 1.44 | 1.03 | 1.93 |
| | 65-74 | 2,483 | 10,353.8 | 85 | 0.82 | 0.66 | 1.02 |
| | >=75 | 3,066 | 12,700.1 | 61 | 0.48 | 0.37 | 0.62 |
| Hemi | <55 | 362 | 3,033.6 | 52 | 1.71 | 1.27 | 2.23 |
| | 55-64 | 471 | 4,169.9 | 78 | 1.87 | 1.48 | 2.33 |
| | 65-74 | 608 | 5,521.3 | 56 | 1.01 | 0.76 | 1.31 |
| | >=75 | 673 | 5,079.5 | 28 | 0.55 | 0.37 | 0.80 |

Revision vs Age Bands

| Age Bands | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|-----------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| <55 | 752 | 4,953.2 | 90 | 1.82 | 1.46 | 2.23 |
| 55-64 | 2,265 | 14,009.0 | 216 | 1.54 | 1.34 | 1.76 |
| 65-74 | 4,876 | 28,457.3 | 243 | 0.85 | 0.75 | 0.97 |
| >=75 | 4,722 | 24,568.7 | 124 | 0.50 | 0.42 | 0.60 |



Revision vs Gender

| Gender | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|--------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| Female | 7,764 | 45,552.7 | 388 | 0.85 | 0.77 | 0.94 |
| Male | 4,851 | 26,435.5 | 285 | 1.08 | 0.95 | 1.21 |

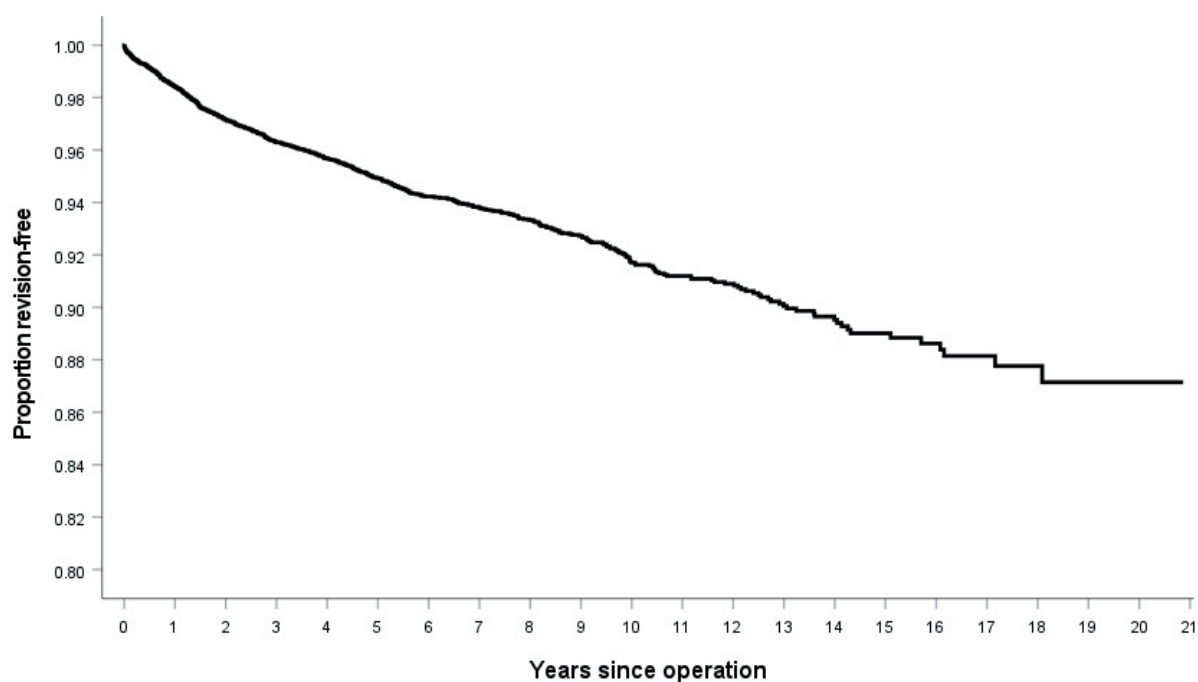
Revision vs Surgeon Annual Workload

| Consultant Number of ops/yr | No. Ops | Observed comp. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|-----------------------------|---------|--------------------|----------------|--------------------------|-------------------------------|------|
| <10 | 3,929 | 24,041.3 | 234 | 0.97 | 0.85 | 1.11 |
| >=10 | 8,686 | 47,946.8 | 439 | 0.92 | 0.83 | 1.01 |

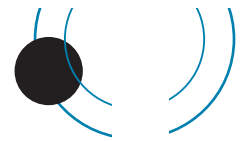
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 21 years from 2000 to 2020, with deceased patients censored at time of death.

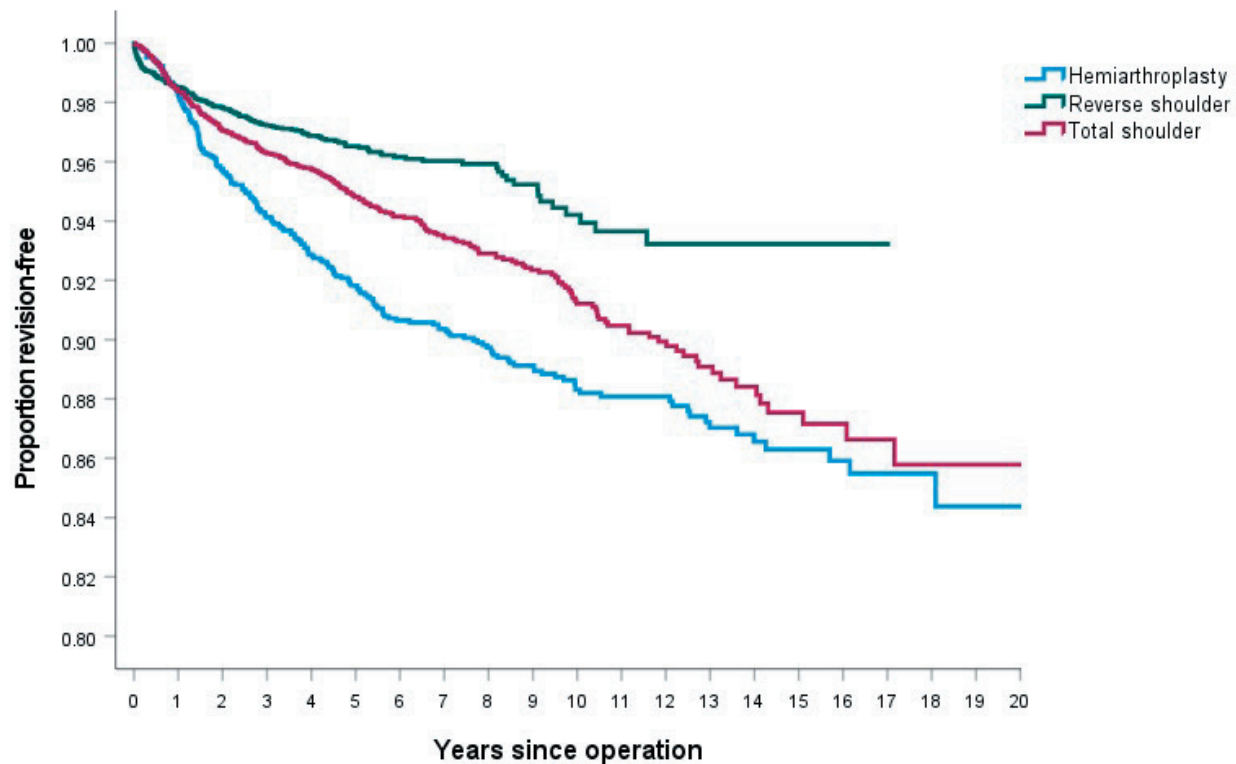
All Shoulders



| Years | % Revision-free | Number |
|-------|-----------------|--------|
| 1 | 98.4 | 11,108 |
| 2 | 97.2 | 9,716 |
| 3 | 96.3 | 8,391 |
| 4 | 95.7 | 7,154 |
| 5 | 94.9 | 6,052 |
| 6 | 94.2 | 4,978 |
| 7 | 93.8 | 4,110 |
| 8 | 93.3 | 3,355 |
| 9 | 92.7 | 2,678 |
| 10 | 91.7 | 2,162 |
| 11 | 91.2 | 1,722 |
| 12 | 90.9 | 1,343 |
| 13 | 90.1 | 1,008 |
| 14 | 89.5 | 735 |
| 15 | 89.0 | 525 |
| 16 | 88.6 | 387 |
| 17 | 88.1 | 247 |
| 18 | 87.8 | 145 |



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-one year period and as at July 2021, there were 7,233 shoulder questionnaire responses registered at six months post-surgery.

The average shoulder score was 36.50 (standard deviation 9.40, range 2 – 48).

| | |
|-----------------|-------|
| Scoring > 41 | 2,691 |
| Scoring 34 - 41 | 2,341 |
| Scoring 27 - 33 | 1,073 |
| Scoring <27 | 1,128 |

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 2,636 individual patients.

At five years post-surgery, 81% of these patients achieved an excellent or good score and had an average of 40.06.

Questionnaires at ten years post-surgery

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

This dataset represents sequential Oxford shoulder scores for 882 individual patients.

At ten years post-surgery, 79% of these patients achieved an excellent or good score and had an average of 39.61.

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 216 individual patients.

At fifteen years post-surgery, 77% of these patients achieved an excellent or good score and had an average of 39.09.

Revision shoulder questionnaire responses

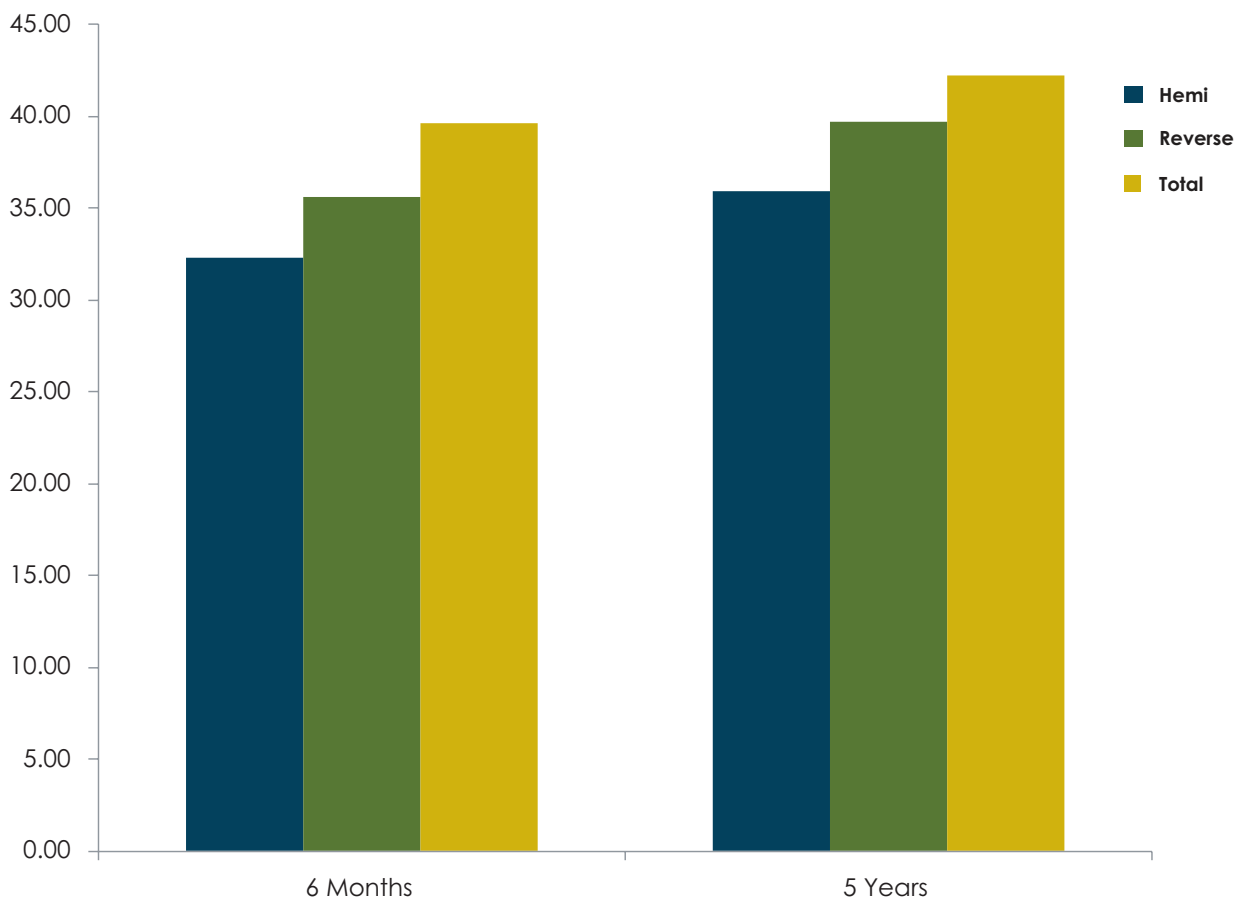
There were 509 revision shoulder responses with 46% achieving an excellent or good score. This group includes all revision shoulder responses. The average revision shoulder score was 31.10 (standard deviation 10.48 range 3 – 48).

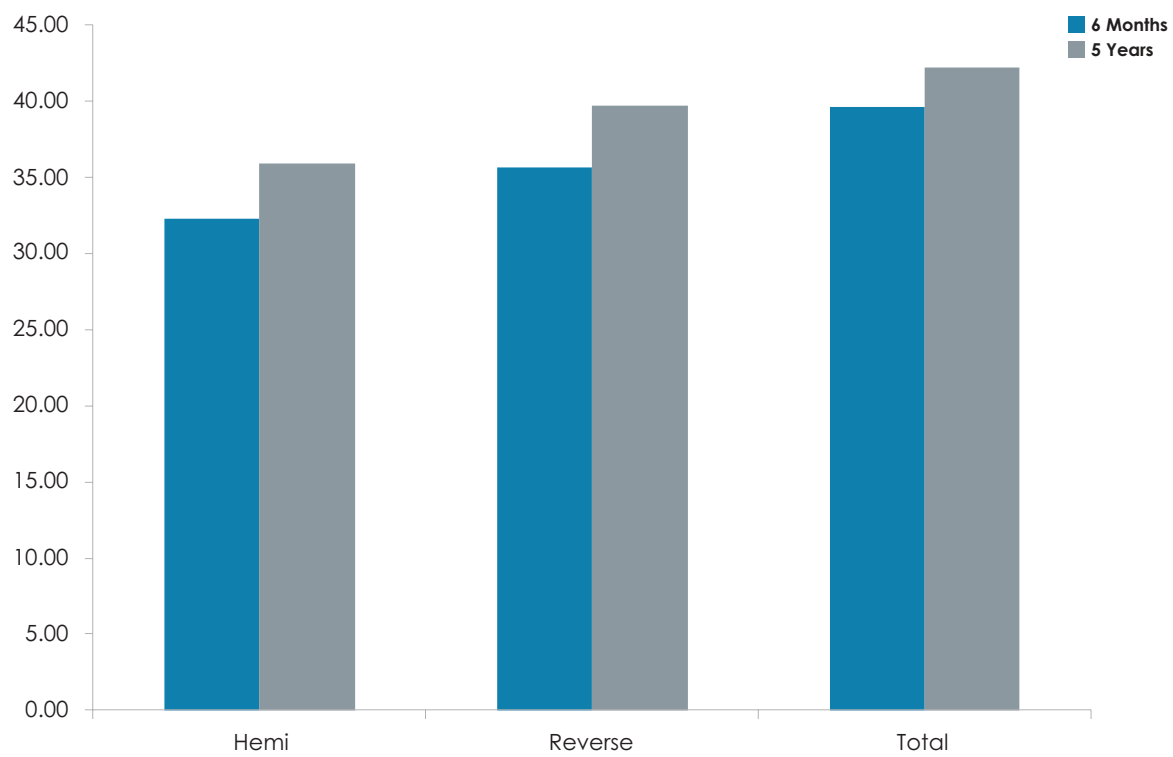
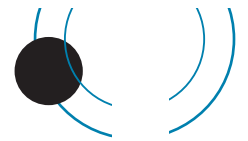


Six Month and Five- Year Oxford Scores for the different arthroplasty types

| | Mean | Std Error | 95% Confidence Interval | |
|---------|-------|-----------|-------------------------|-------|
| Hemi | 32.30 | 0.28 | 31.74 | 32.85 |
| | 35.94 | 0.42 | 35.11 | 36.77 |
| Reverse | 35.63 | 0.16 | 35.32 | 35.95 |
| | 39.71 | 0.28 | 39.16 | 40.26 |
| Total | 39.63 | 0.16 | 39.32 | 39.94 |
| | 42.26 | 0.22 | 41.84 | 42.68 |

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





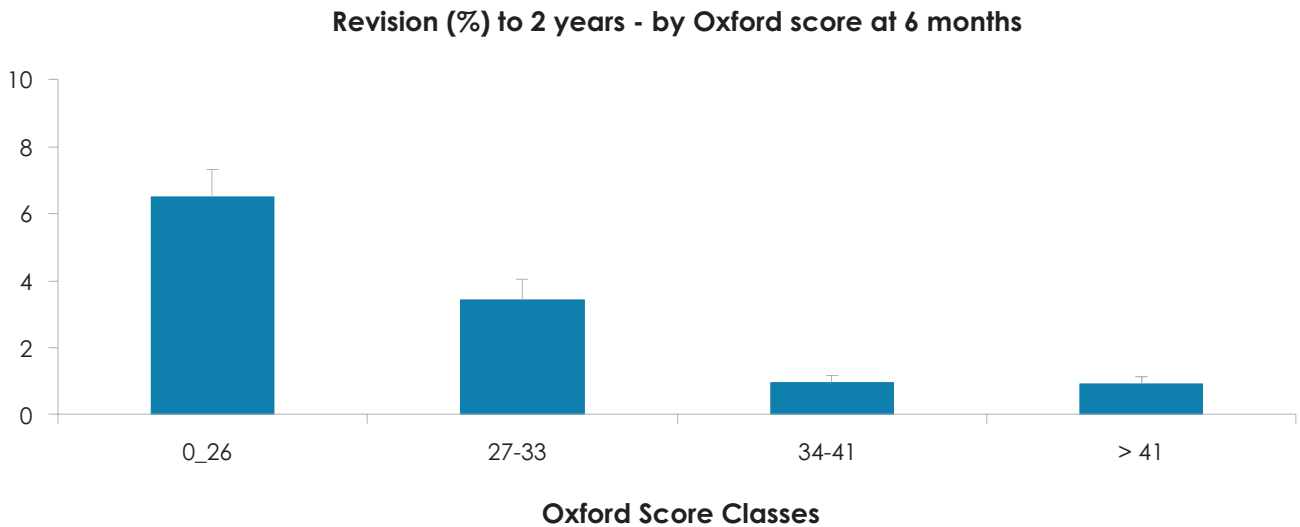


OXFORD 12 SCORE AS A PREDICTOR OF SHOULDER ARTHROPLASTY REVISION

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.



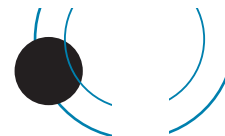
Revision risk versus Kalairajah groupings of Oxford scores within two years of the six- month score date

| Kalairajah group | Revision to 2 years | Number revised | % | Standard error |
|------------------|---------------------|----------------|------|----------------|
| 0-26 | 924 | 60 | 6.49 | 0.81 |
| 27-33 | 900 | 31 | 3.44 | 0.61 |
| 34-41 | 1,974 | 19 | 0.96 | 0.22 |
| > 41 | 2,276 | 21 | 0.92 | 0.20 |

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





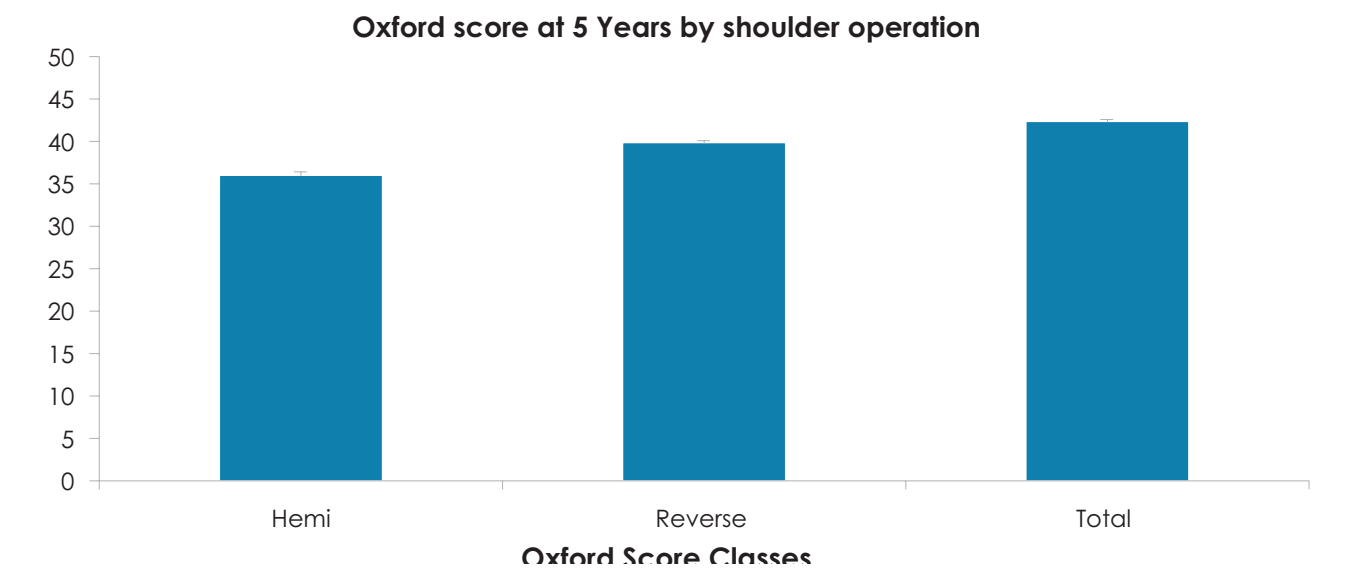
Revision risk versus Kalairajah groupings of Oxford scores within two years of the 5 -year score date

| Kalairajah group | Revision to 2 years | Number revised | % | Standard error |
|------------------|---------------------|----------------|------|----------------|
| 0-26 | 162 | 5 | 3.09 | 1.36 |
| 27-33 | 209 | 5 | 2.39 | 1.06 |
| 34-41 | 446 | 3 | 0.67 | 0.39 |
| > 41 | 1,075 | 4 | 0.37 | 0.19 |

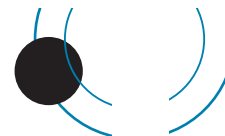
Oxford score at 6 months by shoulder operation



| Operation types | No. of operations | Mean | Std. Error | 95% confidence interval | |
|-----------------|-------------------|------|------------|-------------------------|------|
| Hemi | 1,226 | 32.3 | 0.3 | 31.7 | 32.9 |
| Reverse | 3,410 | 35.6 | 0.2 | 35.3 | 35.9 |
| Total | 2,597 | 39.6 | 0.2 | 39.3 | 39.9 |
| Sum | 7,233 | 36.5 | 0.1 | 36.3 | 36.7 |



| Operation types | No. of operations | Mean | Std. Error | 95% confidence interval | |
|-----------------|-------------------|------|------------|-------------------------|------|
| Hemi | 539 | 35.9 | 0.4 | 35.1 | 36.8 |
| Reverse | 937 | 39.7 | 0.3 | 39.2 | 40.3 |
| Total | 1,160 | 42.3 | 0.2 | 41.8 | 42.7 |
| Sum | 2,636 | 40.1 | 0.2 | 39.7 | 40.4 |



| Operation types | No. of operations | Mean | Std. Error | 95% confidence interval | |
|-----------------|-------------------|------|------------|-------------------------|------|
| Hemi | 271 | 36.9 | 0.6 | 35.8 | 38.1 |
| Reverse | 151 | 39.0 | 0.7 | 37.6 | 40.5 |
| Total | 460 | 41.4 | 0.4 | 40.6 | 42.1 |
| Total | 882 | 39.6 | 0.3 | 39.0 | 40.2 |

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The **twenty-one year** report analyses data for the period January 2000 – December 2020. There were 664 primary elbow procedures registered.

As there were only 2 new data forms registered for the period up to December 2020, all data analysis is for elbow primary.

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 | 503 | 161 |
| Percentage | 75.75 | 24.25 |
| Mean age | 67.91 | 65.82 |
| Maximum age | 92.41 | 91.73 |
| Minimum age | 36.38 | 15.16 |
| Standard dev. | 11.49 | 14.14 |

Previous operation

| | |
|--|-----|
| None | 544 |
| Internal fixation for juxta articular fracture | 40 |
| Synovectomy+-removal radial head | 23 |
| Debridement | 18 |
| Osteotomy | 3 |
| Ligament reconstruction | 4 |
| Interposition arthroplasty | 3 |

Diagnosis

| | |
|---|-----|
| Rheumatoid arthritis/other inflammatory | 318 |
| Post fracture | 229 |
| Osteoarthritis | 98 |
| Post dislocation | 11 |
| Post ligament disruption | 6 |

Approach

| | |
|-----------|-----|
| Posterior | 419 |
| Medial | 110 |
| Lateral | 50 |

Class

| | |
|-------------------------|---|
| Radial head replacement | 2 |
|-------------------------|---|

Systemic antibiotic prophylaxis

| | |
|---|-----|
| Patient number receiving at least one systemic antibiotic | 622 |
|---|-----|

Operating theatre

| | |
|--------------|-----|
| Conventional | 439 |
| Laminar flow | 219 |

Surgeon attire

| | |
|------------------------|----|
| Space Suits/Helmet Fan | 87 |
| Conventional gown | 2 |

ASA Class

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

For the sixteen- year period 2005 – 2020, there were 509 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 | 26 |
| 2 | 229 |
| 3 | 245 |
| 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 sixteen- year period 2005 – 2020.

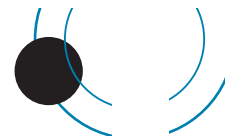
| | |
|-------------------------------|-----|
| Consultant | 522 |
| Advanced trainee supervised | 11 |
| Advanced trainee unsupervised | 6 |

Surgeon and hospital workload

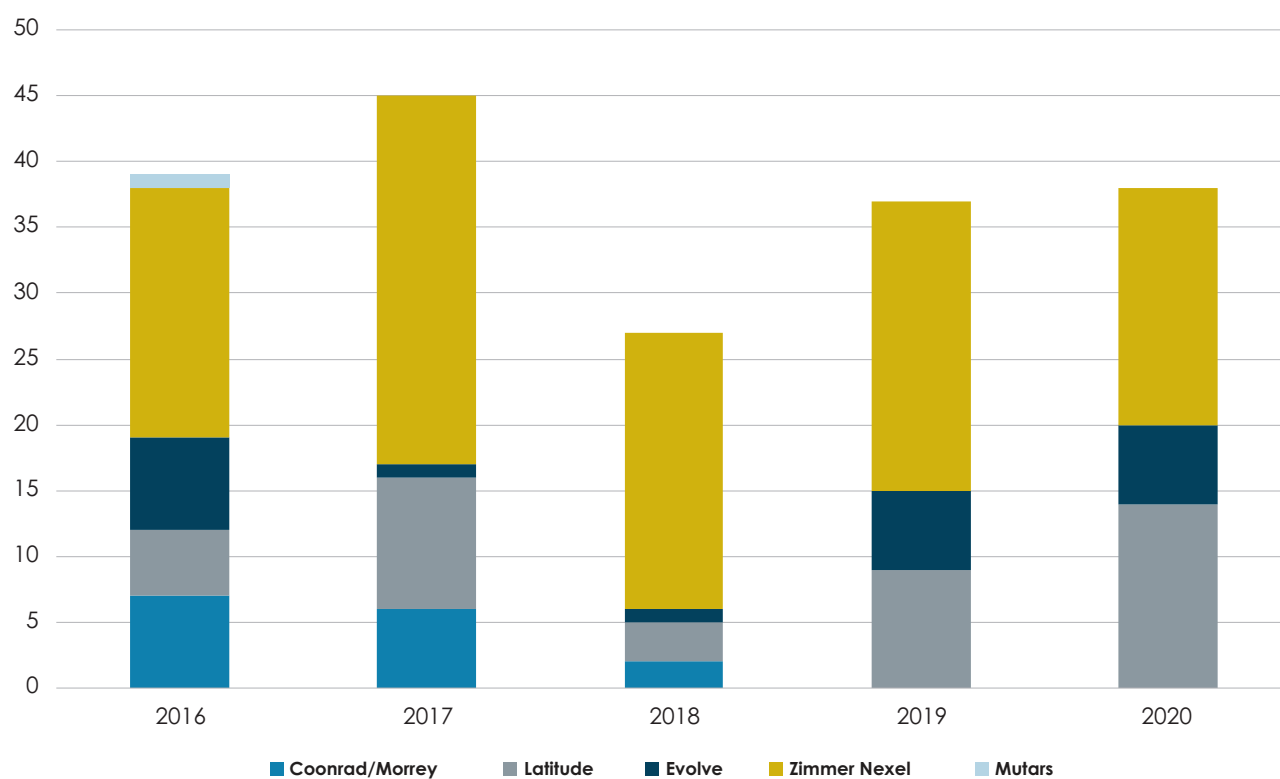
In 2020, 21 surgeons performed 39 primary elbow procedures. These ranged from 1 to 3 per surgeon, with 7 performing 1 elbow procedure and 4 performing 3 procedures.

Hospitals

In 2020, primary elbow replacement was performed in 21 hospitals, of which 13 were public and 8 were private.



MOST USED ELBOW PROSTHESES FOR FIVE YEARS 2016 – 2020



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.

Procedures where all components are removed (e.g. Girdlestone, ankle fusion post failed ankle replacement, or removal of components and insertion of a cement spacer for infection) are all recorded as revisions.

Data Analysis

For the twenty-one year period January 2000 – December 2020, there were 116 revision elbow procedures registered.

The average age for a revision elbow replacement was 65 years, with a range of 30 – 91 years.

| | Female | Male |
|---------------|--------|-------|
| Number | 82 | 34 |
| Percentage | 70.69 | 29.31 |
| Mean | 5.61 | 64.58 |
| Maximum age | 89.08 | 90.50 |
| Minimum age | 31.53 | 30.34 |
| Standard dev. | 10.64 | 14.79 |

REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTIES

This section analyses data for revisions of primary elbow procedures for the twenty- one year period January 2000 – December 2020.

There were 47 revisions of the primary group of 664.

There were 8 that had been revised twice.

Time to revision

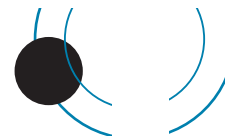
| | |
|--------------------|-------------------------|
| Average | 1,772 days (4.85 years) |
| Maximum | 5,499 days |
| Minimum | 62 days |
| Standard deviation | 1,513 days |

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 |
| Loose pin and bushing | 1 |

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

| Years | Loosening humeral | | Loosening Ulnar | | Deep infection | |
|--------------|-------------------|------|-----------------|------|----------------|------|
| | 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 (CI's) 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 | |
|----------|--------------------------|----------------|----------|-------------------------------|------|
| 664 | 4,573.7 | 47 | 1.03 | 0.76 | 1.37 |

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 | 166.4 | 7 | 4.21 | 1.69 | 8.67 |
| Coonrad/Morrey | 347 | 2,989.7 | 18 | 0.60 | 0.34 | 0.93 |
| Evolve Stem | 32 | 150.7 | 2 | 1.33 | 0.00 | 4.79 |
| Kudo | 18 | 178.7 | 4 | 2.24 | 0.61 | 5.73 |
| Latitude | 119 | 721.0 | 13 | 1.80 | 0.96 | 3.08 |
| Mutars | 1 | 4.9 | 0 | 0.00 | 0.00 | 75.99 |
| Sorbie Questor | 1 | 6.8 | 0 | 0.00 | 0.00 | 54.09 |
| Stanmore custom | 1 | 10.4 | 0 | 0.00 | 0.00 | 35.35 |
| Zimmer Nexel | 127 | 342.31 | 3 | 0.88 | 0.12 | 2.34 |

Revision vs Gender

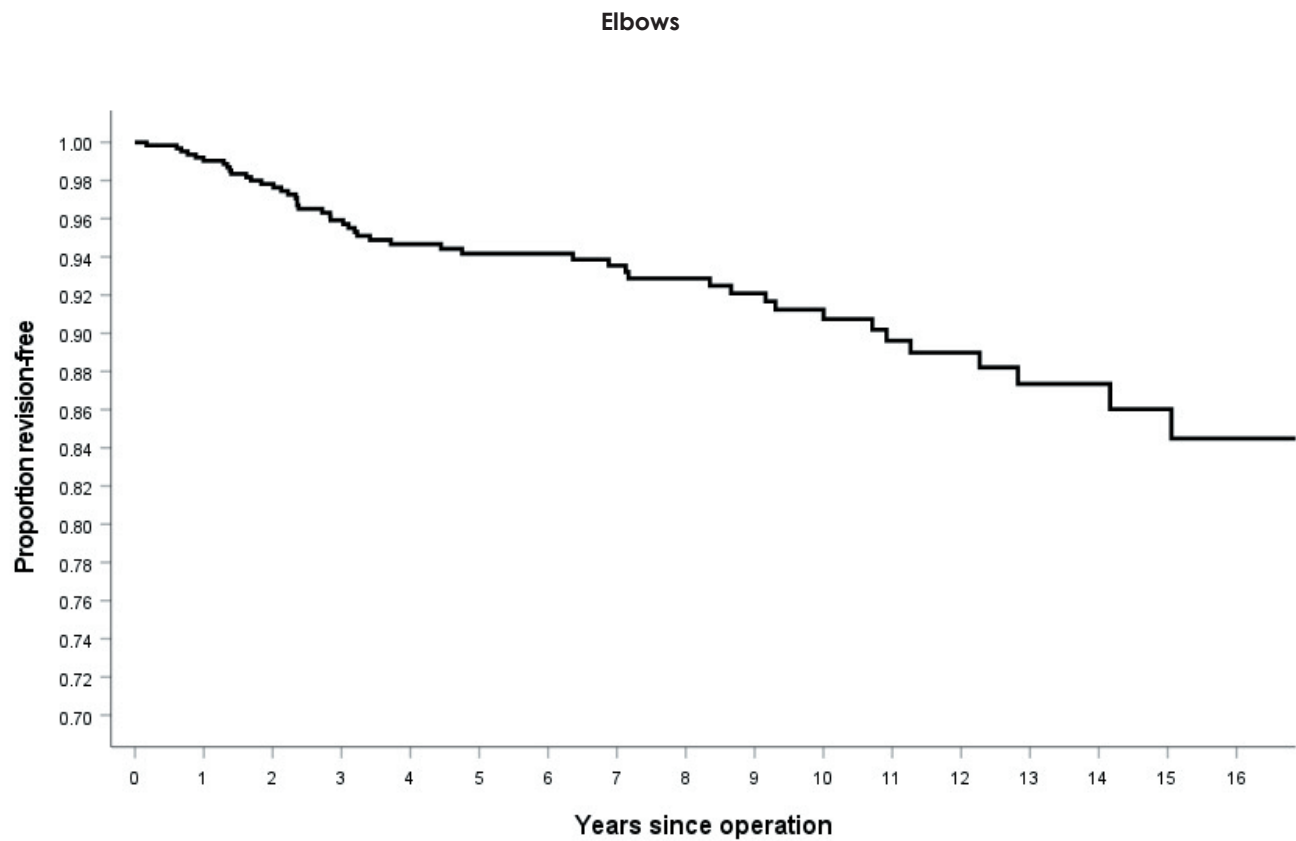
| Gender | No. Ops | Observed component. Yrs | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|---------|---------|-------------------------|----------------|--------------------------|-------------------------------|------|
| Females | 503 | 3,665.9 | 30 | 0.82 | 0.55 | 1.17 |
| Males | 161 | 907.8 | 17 | 1.87 | 1.05 | 2.93 |

Revision vs Age Bands

| Age Bands | No. Ops | Observed component years | Number Revised | Rate/100 component-years | Exact 95% confidence interval | |
|-----------|---------|--------------------------|----------------|--------------------------|-------------------------------|------|
| <55 | 108 | 955.3 | 16 | 1.67 | 0.92 | 2.65 |
| 55-64 | 159 | 1,298.2 | 11 | 0.85 | 0.42 | 1.52 |
| 65-74 | 205 | 1,280.1 | 14 | 1.09 | 0.60 | 1.83 |
| >=75 | 192 | 1,040.1 | 6 | 0.58 | 0.21 | 1.26 |

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 21 years from 2000 to 2020 with deceased patients censored at time of death.



| Years | % Revision-free | Number |
|-------|-----------------|--------|
| 1 | 99.0 | 597 |
| 2 | 97.8 | 539 |
| 3 | 95.9 | 478 |
| 4 | 94.7 | 413 |
| 5 | 94.2 | 358 |
| 6 | 94.2 | 316 |
| 7 | 93.5 | 287 |
| 8 | 92.9 | 252 |
| 9 | 92.1 | 223 |
| 10 | 91.2 | 184 |
| 11 | 89.6 | 154 |
| 12 | 89.0 | 126 |
| 13 | 87.4 | 98 |
| 14 | 87.4 | 71 |
| 15 | 86.0 | 56 |

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTHS POST SURGERY

Questionnaires at six months post-surgery

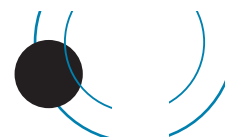
At six months post-surgery patients are sent an outcome questionnaire.

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

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

Total score range 0-48

For the 5 year period 2016 – 2020 there were n = 98 responses. The average score was 33.18.



LUMBAR DISC REPLACEMENT

PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the **nineteen-year** period January 2002 – December 2020. There were 195 lumbar disc replacements registered.

Data Analysis

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

| | Female | Male |
|---------------|--------|-------|
| Number | 86 | 109 |
| Percentage | 44.10 | 55.90 |
| Mean age | 40.50 | 39.49 |
| Maximum age | 62.19 | 60.71 |
| Minimum age | 24.07 | 22.25 |
| Standard dev. | 8.71 | 7.88 |

Disc replacement levels

| | |
|-------|-----|
| L3/4 | 22 |
| L4/5 | 122 |
| L5/S1 | 49 |

Fusion levels

| | |
|-------|-----|
| L3/4 | 16 |
| L4/5 | 121 |
| L5/S1 | 241 |

Previous operation

| | |
|------------|----|
| Discectomy | 30 |
| L3/4 | - |
| L4/5 | 11 |
| L5/S1 | 18 |

Diagnosis

Degenerative disc disease

| | |
|-------|-----|
| L3/4 | 13 |
| L4/5 | 66 |
| L5/S1 | 101 |

Annular tear MRI scan

| | |
|-------|----|
| L3/4 | 14 |
| L4/5 | 73 |
| L5/S1 | 39 |

Discogenic pain on discography

| | |
|-------|----|
| L3/4 | 20 |
| L4/5 | 88 |
| L5/S1 | 64 |

Approach

| | |
|-------------------------|-----|
| Retroperitoneal midline | 154 |
| Retroperitoneal lateral | 4 |
| Transperitoneal | 18 |

Intraoperative complications

| | |
|-----------------------|----|
| Damage to major veins | 13 |
| Subsidence | 1 |

Systemic antibiotic prophylaxis

| | |
|--|-----|
| Patient number receiving systemic antibiotic prophylaxis | 166 |
|--|-----|

Operating theatre

| | |
|--------------|-----|
| Conventional | 118 |
| Laminar flow | 75 |

Surgeon Attire

| | |
|------------------------|---|
| Space suits/Helmet Fan | 2 |
|------------------------|---|

Operative time (skin to skin)

| | |
|------|-------------|
| Mean | 130 minutes |
|------|-------------|

Surgeon grade

| | |
|------------|-----|
| Consultant | 195 |
|------------|-----|

REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

There has been no change in the number of revisions.

There were 3 revisions of the primary group of 195 lumbar disc replacements.

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 **seventeen-year** period January 2004 – December 2020. There were 635 primary cervical disc replacements.

Data Analysis

The average age for a cervical disc replacement was 46 years, with a range of 22 – 73 years.

| | Female | Male |
|---------------|--------|-------|
| Number | 279 | 356 |
| Percentage | 43.94 | 56.06 |
| Mean age | 47.01 | 44.96 |
| Maximum age | 73.32 | 73.02 |
| Minimum age | 23.26 | 22.07 |
| Standard dev. | 8.41 | 9.39 |

Disc replacement levels

| | |
|------|-----|
| C3/4 | 17 |
| C4/5 | 66 |
| C5/6 | 358 |
| C6/7 | 297 |
| C7T1 | 13 |

Previous operation

| | |
|----------------------------------|----|
| Foraminotomy | 20 |
| Adjacent level fusion | 30 |
| Adjacent level disc arthroplasty | 5 |

Diagnosis

| | |
|---------------------|-----|
| Acute disc prolapse | 430 |
| Chronic spondylosis | 79 |
| Neck pain | 34 |

Approach

| | |
|----------------|-----|
| Anterior right | 366 |
| Anterior left | 126 |

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 = 539 |
|--|---------|

Operating theatre

| | |
|--------------|-----|
| Conventional | 317 |
| Laminar flow | 305 |

Surgeon Attire

| | |
|------------------------|----|
| Space suits/Helmet fan | 1 |
| Sterile Hood and Gown | 1 |
| Conventional gown | 16 |

Operative time (skin to skin)

| | |
|---------|-------------|
| Average | 105 minutes |
|---------|-------------|

Surgeon grade

| | |
|-----------------------------|-----|
| Consultant | 630 |
| Advanced trainee supervised | 2 |

Revision Cervical disc replacement

There were 3 revisions registered.

Neck Disability Index Scoring

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

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

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

Example:

$$16 \text{ (total scored)} / 50 \text{ (total possible score)} \times 100 = 32\%$$

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

Example:

$$16 \text{ (total scored)} / 45 \text{ (total possible score)} \times 100 = 35.5\%$$

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

Post-operative score

| | |
|-----------------------|-------|
| Neck Disability Index | 2,139 |
| Mean | 19.07 |

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

VERSION: HP NOV 2020

PRIMARY HIP REPLACEMENT

☐ TOTAL HIP ARTHROPLASTY
 ☐ RESURFACING ARTHROPLASTY
 ☐ HEMIARTHROPLASTY

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | SURGEON TO CHECK & SIGN PLEASE → |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | Surgeon to sign here: |

PREVIOUS OPERATION ON INDEX JOINT [TICK ALL THAT APPLY]

- ☐ None
- ☐ Hip Arthroscopy
- ☐ Internal fixation for juxtaarticular fracture
- ☐ Osteotomy
- ☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Osteoarthritis
- ☐ Rheumatoid arthritis/other inflammatory
- ☐ Acute fracture NOF
- ☐ Old fracture NOF
- ☐ Avascular necrosis
- ☐ Developmental dysplasia / Congenital dislocation
- ☐ Tumour
- ☐ Other [SPECIFY]...

APPROACH [TICK ALL THAT APPLY]

- ☐ Posterior
- ☐ Anterior
- ☐ Superior
- ☐ Lateral
- ☐ Trans-trochanteric (osteotomy)

SURGICAL ADJUNCTS [TICK IF USED]

- ☐ Computer Navigation
- ☐ Robotic assisted

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown

PRIMARY SURGEON

- ☐ Consultant
 ☐ Adv Trainee Unsupervised
 ☐ Adv Trainee Supervised
 ☐ Basic Trainee



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

Cement

[IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Femur

Yes

No

Acetabulum

Yes

No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Femur

Please do not fold placed stickers
bar coded label

Acetabulum

Please do not fold placed stickers
bar coded label

Femoral head

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

VERSION: HR NOV 2020

REVISION / RE-OPERATION HIP

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|--|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | <div style="display: flex; justify-content: space-between; align-items: center;"> <div> STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE </div> </div> |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | |
| DATE OF INDEX OPERATION / / | | SURGEON TO CHECK & SIGN PLEASE → |
| IF RE-REVISION PREVIOUS DATE / / | | |
| Surgeon to sign here: X | | |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

PROCEDURE PERFORMED [TICK ALL THAT APPLY]

- ☐ Change of all components
- ☐ Change of femoral component
- ☐ Change of acetabular shell
- ☐ Change of liner
- ☐ Change of head
- ☐ Removal of components only (Girdlestone)
- ☐ No components added, exchanged, or removed - re-operation only

REASON FOR THIS REVISION

[TICK ALL THAT APPLY] [REVISION = COMPONENT ADDED, CHANGED, OR REMOVED]

- ☐ Deep infection
- ☐ Loosening acetabular component
- ☐ Loosening femoral component
- ☐ Dislocation/instability
- ☐ Fracture femur
- ☐ Failed hemiarthroplasty
- ☐ Poly wear
- ☐ Unexplained pain
- ☐ Other [SPECIFY]...

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee

IF RE-OPERATION ONLY

[NO COMPONENT ADDED, CHANGED OR REMOVED - SPECIFY PROCEDURE]

- ☐ Debridement / Lavage for deep infection
- ☐ Closed reduction of dislocation
- ☐ Open reduction of dislocation
- ☐ Haematoma Evacuation
- ☐ Superficial wound procedure
- ☐ Bone Grafting Lytic lesion only
- ☐ ORIF of periprosthetic fracture
- ☐ Other [SPECIFY]...

APPROACH [TICK ALL THAT APPLY]

- ☐ Posterior
- ☐ Anterior
- ☐ Lateral
- ☐ Trans-trochanteric (osteotomy)

SURGICAL ADJUNCTS [TICK IF USED]

- ☐ Computer Navigation ☐ Robotic assisted

OPERATING THEATRE

- ☐ Conventional **Start Skin Time:** _____
- ☐ Laminar Flow or similar **Finish Skin Time:** _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Cement

[IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Femur

Yes

No

Acetabulum

Yes

No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Femur

Please do not fold placed stickers
bar coded label

Acetabulum

Please do not fold placed stickers
bar coded label

Femoral head

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

The New Zealand Joint Registry

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VERSION: KP NOV 2020

PRIMARY KNEE REPLACEMENT

☐ TOTAL KNEE
 ☐ UNICOMPARTMENTAL - ☐ MEDIAL OR ☐ LATERAL
 ☐ PATELLOFEMORAL

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | SURGEON TO CHECK & SIGN PLEASE → |
| | | Surgeon to sign here: <div style="border: 1px solid black; width: 100px; height: 40px; display: flex; align-items: center; justify-content: center; font-size: 2em;">X</div> |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

PREVIOUS OPERATION ON INDEX JOINT [TICK ALL THAT APPLY]

- ☐ None
- ☐ Osteotomy
- ☐ Ligament reconstruction
- ☐ Meniscectomy
- ☐ Internal fixation for juxtaarticular fracture
- ☐ Synovectomy
- ☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Osteoarthritis
- ☐ Rheumatoid arthritis/other inflammatory
- ☐ Post ligament - disruption/reconstruction
- ☐ Post fracture
- ☐ Avascular necrosis
- ☐ Tumour
- ☐ Other [SPECIFY]...

APPROACH [TICK ALL THAT APPLY]

- ☐ Medial parapatellar
- ☐ Lateral parapatellar
- ☐ Tibial tubercle osteotomy
- ☐ Other [EG EXTENSILE MEASURES]...

SURGICAL ADJUNCTS [TICK IF USED]

- ☐ Computer Navigation
- ☐ Robotic assisted
- ☐ Patient specific cutting guides

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown

PRIMARY SURGEON

- ☐ Consultant
 ☐ Adv Trainee Unsupervised
 ☐ Adv Trainee Supervised
 ☐ Basic Trainee



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

Cement [IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Femur ☐ Yes ☐ No

Tibia ☐ Yes ☐ No

Patella ☐ Yes ☐ No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Femur

Please do not fold placed stickers
bar coded label

Tibia

Please do not fold placed stickers
bar coded label

Patella

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

The New Zealand Joint Registry

Data Forms

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VERSION: KR NOV 2020

REVISION / RE-OPERATION KNEE JOINT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT [IF DIFFERENT FROM PATIENT LABEL] | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> IF BILATERAL THEN DO SEPARATE FORMS | | |
| DATE OF INDEX OPERATION / / IF RE-REVISION PREVIOUS DATE / / | | SURGEON TO CHECK & SIGN PLEASE → X |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

REVISION PROCEDURE PERFORMED [MORE THAN ONE MAY APPLY]

- ☐ Change of all components
- ☐ Change of femoral component
- ☐ Change of tibial component
- ☐ Change of tibial polyethylene only
- ☐ Change of patellar component
- ☐ Addition of patellar component
- ☐ Removal of all components only
- ☐ No components added or changed - re-operation only
- ☐ Other [SPECIFY]...

REASON FOR THIS REVISION [TICK ALL THAT APPLY]

- ☐ Deep infection
- ☐ Loosening femoral component
- ☐ Loosening patellar component
- ☐ Loosening tibial component
- ☐ Failed unicompartmental
- ☐ Wear in non-replaced compartment
- ☐ Periprosthetic Fracture ☐ Femur ☐ Tibia
- ☐ Poly wear
- ☐ Stiffness/Arthrofibrosis
- ☐ Instability
- ☐ Unexplained pain
- ☐ Other [SPECIFY]...

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee

IF RE-OPERATION ONLY [NO COMPONENT ADDED, CHANGED OR REMOVED]

- ☐ Debridement / Lavage for deep infection
- ☐ Manipulation under anaesthetic
- ☐ Superficial wound procedure
- ☐ ORIF Periprosthetic Fracture
- ☐ Other [SPECIFY]...

APPROACH [TICK ALL THAT APPLY]

- ☐ Medial parapatellar
- ☐ Lateral parapatellar
- ☐ Tibial tubercle osteotomy
- ☐ Other [EG EXTENSILE MEASURES]...

SURGICAL ADJUNCTS [TICK IF USED]

- ☐ Computer Navigation
- ☐ Robotic assisted
- ☐ Patient specific cutting guides

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME:

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Cement

[IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Femur

☐ Yes ☐ No

Tibia

☐ Yes ☐ No

Patella

☐ Yes ☐ No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Femur

Please do not fold placed stickers
bar coded label

Tibia

Please do not fold placed stickers
bar coded label

Patella

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

The New Zealand Joint Registry

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VERSION: SP NOV 2020

PRIMARY SHOULDER REPLACEMENT

☐ TOTAL SHOULDER ARTHROPLASTY
 ☐ HEMIARTHROPLASTY
 ☐ REVERSE SHOULDER

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|--|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT [IF DIFFERENT FROM PATIENT LABEL] | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> IF BILATERAL THEN DO SEPARATE FORMS | | SURGEON TO CHECK & SIGN PLEASE → X |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

PREVIOUS OPERATION ON INDEX JOINT [TICK ALL THAT APPLY]

- ☐ None
☐ Rotator Cuff Repair
☐ Previous stabilisation
☐ Internal fixation for juxtaarticular fracture
☐ Superior capsular reconstruction
☐ Arthroscopic debridement/decompression
☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Osteoarthritis
☐ Rheumatoid arthritis/other inflammatory
☐ Cuff tear arthropathy
☐ Massive cuff tear without arthritis
☐ Acute fracture proximal humerus
☐ Post old trauma
☐ Avascular necrosis
☐ Post recurrent dislocation
☐ Tumour
☐ Other [SPECIFY]...

APPROACH [TICK ALL THAT APPLY]

- ☐ Deltopectoral
☐ Navigation
☐ Patient specific instrumentation
☐ Other [SPECIFY]...

PRIMARY SURGEON

- ☐ Consultant
 ☐ Adv Trainee Unsupervised
 ☐ Adv Trainee Supervised
 ☐ Basic Trainee

HUMERAL STEM TYPE

- ☐ Standard
☐ Stemless
☐ Short/metaphyseal stem

STRUCTURAL BONE GRAFT GLENOID

- ☐ Allograft
 ☐ Autograft

GLENOID MORPHOLOGY

- ☐ A1
 ☐ B1
 ☐ C
☐ A2
 ☐ B2
 ☐ D
☐ B3

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____
 Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
☐ Conventional Gown



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

Cement

[IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Humerus

Yes

No

Glenoid

Yes

No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Humerus

Please do not fold placed stickers
bar coded label

Glenoid

Please do not fold placed stickers
bar coded label

Humeral Head

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

The New Zealand Joint Registry

Data Forms

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VERSION: SR NOV 2020

REVISION / RE-OPERATION SHOULDER

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT [IF DIFFERENT FROM PATIENT LABEL] | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> IF BILATERAL THEN DO SEPARATE FORMS | | |
| DATE OF INDEX OPERATION / / | | SURGEON TO CHECK & SIGN PLEASE → X |
| IF RE-REVISION PREVIOUS DATE / / | | |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

REVISION PROCEDURE [TICK ALL THAT APPLY]

- ☐ Change of all components
- ☐ Change of glenoid component
- ☐ Change of humeral component
- ☐ Change of liner
- ☐ Change of head only
- ☐ Removal of components only (with or without spacer insertion)
- ☐ Removal only humerus component
- ☐ Removal only glenoid component
- ☐ Conversion procedure [SPECIFY]...
- ☐ No components added or changed - re-operation only
- ☐ Other [SPECIFY]...

REASON FOR THIS REVISION [TICK ALL THAT APPLY]

- ☐ Deep infection
- ☐ Loosening glenoid component
- ☐ Loosening humeral component
- ☐ Dislocation/instability anterior
- ☐ Instability posterior
- ☐ Rotator cuff impingement/failure
- ☐ Fracture humerus
- ☐ Implant breakage/dissociation
- ☐ Glenoid erosion
- ☐ Other [SPECIFY]...

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee

IF RE-OPERATION ONLY

[NO COMPONENT ADDED, CHANGED OR REMOVED - SPECIFY PROCEDURE]

- ☐ Closed reduction of dislocation
- ☐ Debridement / Lavage for deep infection
- ☐ MUA
- ☐ Open reduction of dislocation
- ☐ Superficial wound procedure
- ☐ Subscapular repair

APPROACH [TICK ALL THAT APPLY]

- ☐ Deltopectoral
- ☐ Patient specific instrument
- ☐ Other [SPECIFY]...

BONE GRAFT

- ☐ Allograft ☐ Autograft

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Cement

[IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Humerus

Yes

No

Glenoid

Yes

No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Humerus

Please do not fold placed stickers
bar coded label

Glenoid

Please do not fold placed stickers
bar coded label

Humeral Head

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

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Data Forms

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VERSION: AP NOV 2020

PRIMARY ANKLE REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT [IF DIFFERENT FROM PATIENT LABEL] | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> IF BILATERAL THEN DO SEPARATE FORMS | | |
| SURGEON TO CHECK & SIGN PLEASE → | | Surgeon to sign here: |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

PREVIOUS OPERATION ON INDEX JOINT [TICK ALL THAT APPLY]

- ☐ None
- ☐ Internal fixation for juxtaarticular fracture
- ☐ Arthrodesis
- ☐ Ligament reconstruction
- ☐ Subjacent fusion
- ☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Post fracture
- ☐ Osteoarthritis
- ☐ Rheumatoid arthritis / other inflammatory
- ☐ AVN
- ☐ Instability
- ☐ Other [SPECIFY]...

X-RAY

- ☐ Concentric or mild deformity
- ☐ >10 degrees varus
- ☐ >10 degrees valgus

PRIMARY SURGEON

- ☐ Consultant
- ☐ Advanced trainee supervised
- ☐ Advanced trainee unsupervised

CONCURRENT SURGERY [TICK ALL THAT APPLY]

- ☐ Achilles or calf lengthening
- ☐ Ligament reconstruction: medial ☐ or lateral ☐
- ☐ Hindfoot fusion or osteotomy
- ☐ Midfoot fusion or osteotomy

APPROACH [TICK ALL THAT APPLY]

- ☐ Anterior
- ☐ Lateral
- ☐ Patient specific instrument
- ☐ Computer Navigation
- ☐ Robotic

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

- ☐ Cephazolin
- ☐ Other [SPECIFY]...

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Cement

[IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Tibia

☐ Yes ☐ No

Talus

☐ Yes ☐ No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Tibia

Please do not fold placed stickers
bar coded label

Talus

Please do not fold placed stickers
bar coded label

Bearing

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

VERSION: AR NOV 2020

REVISION / RE-OPERATION ANKLE JOINT REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | |
| DATE OF INDEX OPERATION / / IF RE-REVISION PREVIOUS DATE / / | | SURGEON TO CHECK & SIGN PLEASE → X |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

DIAGNOSIS [TICK ALL THAT APPLY]

- ☐ Impingement
- ☐ Osteolysis: Talus ☐ or Tibia ☐
- ☐ Pain with no obvious cause
- ☐ Subjacent arthritis
- ☐ Bearing failure: wear ☐ or fracture ☐
- ☐ Failure to osseointegrate
- ☐ Periprosthetic #
- ☐ Deep infection
- ☐ Malalignment
- ☐ Subsidence: Talus ☐ or Tibia ☐
- ☐ Other [SPECIFY]...

REVISION PROCEDURE [TICK ALL THAT APPLY]

- ☐ Bearing exchange only
- ☐ Amputation
- ☐ Extraction +/- cement spacer
- ☐ Fusion: TT ☐ or TTC ☐
- ☐ Tibia: standard ☐ revision ☐ custom ☐ allograft composite ☐
- ☐ Talus: standard ☐ revision ☐ custom ☐ allograft composite ☐
- ☐ Additional procedures [SPECIFY]...

PRIMARY SURGEON

- ☐ Consultant
- ☐ Advanced trainee supervised
- ☐ Advanced trainee unsupervised

RE-OPERATION PROCEDURE [TICK ALL THAT APPLY]

- ☐ Tendon surgery
- ☐ Subjacent Fusions [SPECIFY]...
- ☐ Debridement for infection +/- bearing exchange for access
- ☐ Debridement for impingement: open ☐ or arthroscopic ☐
- ☐ Ligament reconstruction: medial ☐ or lateral ☐
- ☐ ORIF Peri prosthetic #
- ☐ Grafting of cysts: with bearing exchange ☐
- ☐ Osteotomy [SPECIFY]...
- ☐ Other [SPECIFY]...

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

- ☐ Cephazolin
- ☐ Other [SPECIFY]...

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Cement [IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Tibia

☐ Yes ☐ No

Talus

☐ Yes ☐ No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Tibia

Please do not fold placed stickers
bar coded label

Talus

Please do not fold placed stickers
bar coded label

Bearing

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

The New Zealand Joint Registry


Data Forms

P.167

VERSION: EP NOV 2020

PRIMARY ELBOW REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT [IF DIFFERENT FROM PATIENT LABEL] | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> IF BILATERAL THEN DO SEPARATE FORMS | |  |
| | | |
| SURGEON TO CHECK & SIGN PLEASE → | | Surgeon to sign here: <div style="border: 1px solid black; width: 100px; height: 40px; margin: 0 auto; text-align: center; line-height: 40px;">X</div> |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

PREVIOUS OPERATION ON INDEX JOINT [TICK ALL THAT APPLY]

- ☐ None
- ☐ Internal fixation for juxtaarticular fracture
- ☐ Ligament reconstruction
- ☐ Interposition arthroplasty
- ☐ Debridement
- ☐ Synovectomy + removal radial head
- ☐ Osteotomy
- ☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Osteoarthritis
- ☐ Rheumatoid arthritis / other inflammatory
- ☐ Tumour
- ☐ Post fracture
- ☐ Post ligament disruption
- ☐ Post dislocation
- ☐ Other [SPECIFY]...

CLASS

- ☐ Hemiathroplasty (distal humerus replacement)
- ☐ Radial head replacement
- ☐ Radiocapitellar replacement
- ☐ Total Ulnohumeral replacement (unconstrained/linked)
- ☐ Total Ulnohumeral replacement (semiconstrained/linked)

APPROACH [TICK ALL THAT APPLY]

- ☐ Medial
- ☐ Lateral
- ☐ Posterior

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee



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

Cement [IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Humerus ☐ Yes ☐ No

Ulna ☐ Yes ☐ No

Radial ☐ Yes ☐ No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Humerus

Please do not fold placed stickers
bar coded label

Ulna

Please do not fold placed stickers
bar coded label

Radial Head

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

The New Zealand Joint Registry

Data Forms

P.169

VERSION: ER NOV 2020

REVISION / RE-OPERATION ELBOW JOINT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | |
| DATE OF INDEX OPERATION / / IF RE-REVISION PREVIOUS DATE / / | | SURGEON TO CHECK & SIGN PLEASE → X |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

REVISION PROCEDURE [TICK ALL THAT APPLY]

- ☐ Change of humeral component
- ☐ Change of ulnar component
- ☐ Change of radial head component
- ☐ Change of all components
- ☐ Removal of components
- ☐ Other [SPECIFY]...

REASON FOR REVISION

- ☐ Loosening humeral component
- ☐ Loosening ulnar component
- ☐ Loosening radial head component
- ☐ Unexplained pain
- ☐ Deep infection
- ☐ Fracture humerus
- ☐ Fracture ulna
- ☐ Dislocations
- ☐ Other [SPECIFY]...

IF RE-OPERATION ONLY

[NO COMPONENT ADDED, CHANGED OR REMOVED - SPECIFY PROCEDURE]

- ☐ Closed reduction of dislocation
- ☐ Open reduction of dislocation
- ☐ Treatment deep infection
- ☐ Superficial wound procedure
- ☐ MUA

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee

CLASS

- ☐ Hemiathroplasty (distal humerus replacement)
- ☐ Radial head replacement
- ☐ Radiocapitellar replacement
- ☐ Total Ulnohumeral replacement (unconstrained/linked)
- ☐ Total Ulnohumeral replacement (semiconstrained/linked)

APPROACH [TICK ALL THAT APPLY]

- ☐ Medial
- ☐ Lateral
- ☐ Posterior

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Cement [IF MORE THAN ONE MIX IS USED ONLY ONE CEMENT STICKER IS REQUIRED]

Humerus ☐ Yes ☐ No

Ulna ☐ Yes ☐ No

Radial ☐ Yes ☐ No

PLACE CEMENT STICKER OR COMPLETE

Cement Name:

Cement Antibiotic (if present):

Humerus

Please do not fold placed stickers
bar coded label

Ulna

Please do not fold placed stickers
bar coded label

Radial Head

Please do not fold placed stickers
bar coded label

Augments

Please do not fold placed stickers
bar coded label

IMPORTANT
IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

VERSION: CP NOV 2020

PRIMARY CERVICAL DISC REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | |
| SURGEON TO CHECK & SIGN PLEASE → | | Surgeon to sign here: <div style="border: 1px solid black; width: 100px; height: 40px; display: flex; align-items: center; justify-content: center;"> X </div> |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

LEVELS OF DISC REPLACEMENT

- ☐ C 3/4
- ☐ C 4/5
- ☐ C 5/6
- ☐ C 6/7
- ☐ C 7/T1
- ☐ Other [SPECIFY]...

PREVIOUS OPERATION

- ☐ Foreminotomy
- ☐ Adjacent Level Fusion
- ☐ Adjacent Level Disc Arthroplasty
- ☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Acute Disc Prolapse
- ☐ Chronic Spondylosis
- ☐ Neck Pain
- ☐ Other [SPECIFY]...

PRIMARY SURGEON

- ☐ Consultant
 ☐ Adv Trainee Unsupervised
 ☐ Adv Trainee Supervised
 ☐ Basic Trainee

APPROACH [TICK ALL THAT APPLY]

- ☐ Anterior - Right
- ☐ Anterior - Left
- ☐ Other [SPECIFY]...

INTRAOPERATIVE COMPLICATIONS

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Implants

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IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

VERSION: CR NOV 2020

REVISION / RE-OPERATION CERVICAL DISC REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|--|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | <p>STICK PATIENT LABEL HERE</p> <p>PLEASE PLACE IMPLANT LABELS ON THE REVERSE</p> |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | |
| DATE OF INDEX OPERATION / / IF RE-REVISION PREVIOUS DATE / / | | SURGEON TO CHECK & SIGN PLEASE → X |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

LEVELS OF REVISION

- ☐ C 3/4
- ☐ C 4/5
- ☐ C 5/6
- ☐ C 6/7
- ☐ C 7/T1
- ☐ Other [SPECIFY]...

REASON FOR REVISION

- ☐ Dislocation of component
- ☐ Failure of component
- ☐ Adjacent level surgery
- ☐ Additional decompression required
- ☐ Heterotopic calcification
- ☐ Infection
- ☐ Pain (neck)
- ☐ Other [SPECIFY]...

REVISION

- ☐ Replace disc prosthesis (same)
- ☐ Replace disc prosthesis (different)
- ☐ Removal only
- ☐ Fuse
- ☐ Other [SPECIFY]...

APPROACH [TICK ALL THAT APPLY]

- ☐ Computer Navigation
- ☐ Trans-trochanteric
- ☐ Minimally invasive surgery
- ☐ Anterior
- ☐ Posterior
- ☐ Lateral

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown

PRIMARY SURGEON

- ☐ Consultant
- ☐ Adv Trainee Unsupervised
- ☐ Adv Trainee Supervised
- ☐ Basic Trainee



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

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Implants

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bar coded label


IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

VERSION: LP NOV 2020

PRIMARY LUMBAR DISC REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT [IF DIFFERENT FROM PATIENT LABEL] | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> IF BILATERAL THEN DO SEPARATE FORMS | |  |

SURGEON TO CHECK & SIGN PLEASE →

Surgeon to sign here:

X

FUNDING

☐ ACC ☐ Private ☐ DHB ☐ DHB Outsourced

LEVELS OF DISC REPLACEMENT

- ☐ L 3/4
- ☐ L 4/5
- ☐ L 5/S1

LEVELS OF FUSION

- ☐ L 3/4
- ☐ L 4/5
- ☐ L 5/S1

PREVIOUS OPERATION

- ☐ Discectomy L 3/4 ☐ L 4/5 ☐ L 5/S1 ☐
- ☐ Other L 3/4 ☐ L 4/5 ☐ L 5/S1 ☐ [SPECIFY]...
- ☐ Other [SPECIFY]...

DIAGNOSIS

- ☐ Degenerative Disc disease
L 3/4 ☐ L 4/5 ☐ L 5/S1 ☐ [PLAIN X-RAY CHANGES PRESENT]
Other [SPECIFY]...
- ☐ Annular tear MRI scan
L 3/4 ☐ L 4/5 ☐ L 5/S1 ☐ [NORMAL PLAIN X-RAY]
Other [SPECIFY]...
- ☐ Discogenic pain on discography
L 3/4 ☐ L 4/5 ☐ L 5/S1 ☐
Other [SPECIFY]...

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee

APPROACH [TICK ALL THAT APPLY]

- ☐ Retroperitoneal midline abdominal wall incision
- ☐ Retroperitoneal lateral abdominal wall incision
- ☐ Transperitoneal
- ☐ Other [SPECIFY]...

INTRAOPERATIVE COMPLICATIONS

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Implants

Please do not fold placed stickers
bar coded label

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Implants

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IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

VERSION: 18 NOV 2020

REVISION / RE-OPERATION LUMBAR DISC REPLACEMENT

NEW ZEALAND JOINT REGISTRY - DO NOT PLACE IN PATIENT NOTES - TO BE RETAINED IN THEATRE SUITE

| | | |
|---|--------------------|---|
| DATE | THEATRE NO. | HOSPITAL NAME |
| ASA CLASS 1 2 3 4 [PLEASE CIRCLE] | | STICK PATIENT LABEL HERE PLEASE PLACE IMPLANT LABELS ON THE REVERSE |
| BMI | | |
| CONSULTANT <small>[IF DIFFERENT FROM PATIENT LABEL]</small> | | |
| <input type="radio"/> LEFT - SIDE - RIGHT <input type="radio"/> <small>IF BILATERAL THEN DO SEPARATE FORMS</small> | | |
| DATE OF INDEX OPERATION / / IF RE-REVISION PREVIOUS DATE / / | | SURGEON TO CHECK & SIGN PLEASE → X |
| FUNDING <input type="radio"/> ACC <input type="radio"/> Private <input type="radio"/> DHB <input type="radio"/> DHB Outsourced | | |

REASON FOR REVISION

- ☐ Loosening of components
- ☐ Dislocation of articulating core
- ☐ Loss of spinal alignment
- ☐ Fracture of vertebra
- ☐ Deep infection
- ☐ Removal of components
- ☐ Pain
- ☐ Other [SPECIFY]...

REVISION

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

LEVELS OF DISC REPLACEMENT

- ☐ L 3/4
- ☐ L 4/5
- ☐ L 5/S1

LEVELS OF FUSION

- ☐ L 3/4
- ☐ L 4/5
- ☐ L 5/S1

PRIMARY SURGEON

- ☐ Consultant ☐ Adv Trainee Unsupervised ☐ Adv Trainee Supervised ☐ Basic Trainee

APPROACH [TICK ALL THAT APPLY]

- ☐ Retroperitoneal midline abdominal wall incision
- ☐ Retroperitoneal lateral abdominal wall incision
- ☐ Posterior Approach for in-situ fusion
- ☐ Transperitoneal
- ☐ Other [SPECIFY]...

INTRAOPERATIVE COMPLICATIONS

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

NAME: _____

OPERATING THEATRE

- ☐ Conventional
- ☐ Laminar Flow or similar

OPERATING TIME

Start Skin Time: _____

Finish Skin Time: _____

SURGEON ATTIRE

- ☐ Space Suits/Helmet Fan: ☐ One-piece Toga or ☐ Sterile Hood and Gown
- ☐ Conventional Gown



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

Implants

Please do not fold placed stickers
bar coded label

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Implants

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bar coded label

IMPORTANT

IF A BILATERAL PROCEDURE TWO COMPLETED FORMS ARE REQUIRED

PRIMARY HIP REPLACEMENT QUESTIONNAIRE**Please circle the answer which best describes yourself OVER THE LAST 4 WEEKS**

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.



| LEFT | PLEASE CIRCLE THE SIDE YOUR SURGERY WAS ON IN <u>September 2013</u> <small>If your surgery was bilateral, you will need to complete a questionnaire for each side</small> | RIGHT |
|---|--|-------------------------------|
| 1. How would you describe the pain you usually have from your operated on hip? | | |
| ④ None | ③ Very mild | ② Mild |
| ① Moderate | | |
| ① 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/over 30 minutes | ③ 16 to 30 minutes | ② 5 to 15 minutes |
| ① Around the house only | | |
| ① Unable, 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① 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 | | |
| ① Every night | | |
| Overall, how satisfied are you with the outcome of your hip surgery? | | |
| ④ Very satisfied | ③ Somewhat satisfied | ② Neutral |
| ① Somewhat dissatisfied | | |
| ① Dissatisfied | | |

PRIMARY KNEE REPLACEMENT QUESTIONNAIRE**Please circle the answer which best describes yourself OVER THE LAST 4 WEEKS**

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.



| | | | | |
|-------------|---|--|---|--------------|
| LEFT | ← | PLEASE CIRCLE THE SIDE YOUR SURGERY WAS ON IN _____ If your surgery was bilateral, you will need to complete a questionnaire for each side | → | RIGHT |
|-------------|---|--|---|--------------|

1. How would you describe the pain you usually have from your operated on knee?

| | | | | |
|------|-----------|------|----------|--------|
| ④ | ③ | ② | ① | ① |
| None | Very mild | Mild | Moderate | 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 | ③ | ② | ① | ① |
| No pain/over 30 minutes | 16 to 30 minutes | 5 to 15 minutes | Around the house only | Unable, 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 | ③ | ② | ① | ① |
| No trouble at all | Very little trouble | Moderate trouble | Extreme difficulty | Impossible to do |
4. Could you kneel down and get up again afterwards on your operated knee?

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

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
6. Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?

| | | | | |
|-------------------|---------------------|------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No trouble at all | Very little trouble | Moderate trouble | Extreme difficulty | Impossible to do |
7. How much has pain from your operated on knee interfered with your usual work (including housework)?

| | | | | |
|------------|--------------|------------|---------|---------|
| ④ | ③ | ② | ① | ① |
| Not at all | A little bit | Moderately | Greatly | 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 | ③ | ② | ① | ① |
| Not at all painful | Slightly painful | Moderately painful | Very painful | Unbearable |
9. Have you felt that your operated on knee might suddenly "give way" or let you down?

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

| | | | | |
|--------------|-----------------------------|--------------------------|------------------|-----------------|
| ④ | ③ | ② | ① | ① |
| Rarely/never | Sometimes, or just at first | Often, not just at first | Most of the time | All of the time |
11. Could you walk down one flight of stairs?

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
12. Have you been troubled by pain from your operated on knee in bed at night?

| | | | | |
|-----------|--------------------|-------------|-------------|-------------|
| ④ | ③ | ② | ① | ① |
| No nights | Only 1 or 2 nights | Some nights | Most nights | Every night |
- Overall, how satisfied are you with the outcome of your knee surgery?

| | | | | |
|----------------|--------------------|---------|-----------------------|--------------|
| ④ | ③ | ② | ① | ① |
| Very satisfied | Somewhat satisfied | Neutral | Somewhat dissatisfied | Dissatisfied |

PRIMARY SHOULDER REPLACEMENT QUESTIONNAIRE**Please circle the answer which best describes yourself OVER THE LAST 4 WEEKS**

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.



| | | | | |
|-------------|---|--|---|--------------|
| LEFT | ← | PLEASE CIRCLE THE SIDE YOUR SURGERY WAS ON IN _____ If your surgery was bilateral, you will need to complete a questionnaire for each side | → | RIGHT |
|-------------|---|--|---|--------------|

1. How would you describe the worst pain you have had from your operated on shoulder?

| | | | | |
|------|------|----------|--------|------------|
| ④ | ③ | ② | ① | ① |
| None | Mild | Moderate | Severe | Unbearable |
2. How would you describe the pain you usually have from your operated on shoulder?

| | | | | |
|------|------|----------|--------|------------|
| ④ | ③ | ② | ① | ① |
| None | Mild | Moderate | Severe | Unbearable |
3. Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?

| | | | | |
|-------------------|---------------------|------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No trouble at all | Very little trouble | Moderate trouble | Extreme difficulty | Impossible to do |
4. Have you been able to use a knife and fork at the same time?

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

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
6. Could you carry a tray containing a plate of food across a room?

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
7. Could you brush/comb your hair with the operated on arm?

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
8. Have you had any trouble dressing yourself because of your operated on shoulder?

| | | | | |
|-------------------|---------------------|------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No trouble at all | Very little trouble | Moderate trouble | Extreme difficulty | Impossible to do |
9. Could you hang your clothes up in a wardrobe – using the operated on arm?

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
10. Have you been able to wash and dry yourself under both arms?

| | | | | |
|-------------|------------------------|--------------------------|-------------------------|----------------|
| ④ | ③ | ② | ① | ① |
| Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
11. How much has pain from your operated on shoulder interfered with your usual work hobbies/recreational activities (including housework)?

| | | | | |
|------------|--------------|------------|---------|---------|
| ④ | ③ | ② | ① | ① |
| Not at all | A little bit | Moderately | Greatly | Totally |
12. Have you been troubled by pain from your operated on shoulder in bed at night?

| | | | | |
|-----------|--------------------|-------------|-------------|-------------|
| ④ | ③ | ② | ① | ① |
| No nights | Only 1 or 2 nights | Some nights | Most nights | Every night |

Overall, how satisfied are you with the outcome of your shoulder surgery?

| | | | | |
|----------------|--------------------|---------|-----------------------|--------------|
| ④ | ③ | ② | ① | ① |
| Very satisfied | Somewhat satisfied | Neutral | Somewhat dissatisfied | Dissatisfied |

PRIMARY ELBOW REPLACEMENT QUESTIONNAIRE**Please circle the answer which best describes yourself OVER THE LAST 4 WEEKS**

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.



| | | | | |
|-------------|---|--|---|--------------|
| LEFT | ← | PLEASE CIRCLE THE SIDE YOUR SURGERY WAS ON IN _____ If your surgery was bilateral, you will need to complete a questionnaire for each side | → | RIGHT |
|-------------|---|--|---|--------------|

1. Have you had difficulty lifting things in your home, such as putting out the rubbish, because of your elbow problem?

| | | | | |
|---------------|----------------------------|---------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No difficulty | A little bit of difficulty | Moderate difficulty | Extreme difficulty | Impossible to do |
2. Have you had difficulty carrying bags of shopping, because of your elbow problem?

| | | | | |
|---------------|----------------------------|---------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No difficulty | A little bit of difficulty | Moderate difficulty | Extreme difficulty | Impossible to do |
3. Have you had any difficulty washing yourself all over, because of your elbow problem?

| | | | | |
|---------------|----------------------------|---------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No difficulty | A little bit of difficulty | Moderate difficulty | Extreme difficulty | Impossible to do |
4. Have you had any difficulty dressing yourself, because of your elbow problem?

| | | | | |
|---------------|----------------------------|---------------------|--------------------|------------------|
| ④ | ③ | ② | ① | ① |
| No difficulty | A little bit of difficulty | Moderate difficulty | Extreme difficulty | Impossible to do |
5. Have you felt that your elbow problem is "controlling your life"?

| | | | | |
|----------------|--------------|-----------|-----------|-----------|
| ④ | ③ | ② | ① | ① |
| No, not at all | Occasionally | Some days | Most days | Every day |
6. How much has your elbow problem "been on your mind"?

| | | | | |
|------------|----------------------|------------------|------------------|-----------------|
| ④ | ③ | ② | ① | ① |
| Not at all | A little of the time | Some of the time | Most of the time | All of the time |
7. Have you been troubled by pain from your elbow in bed at night?

| | | | | |
|------------|------------|-------------|-------------|-------------|
| ④ | ③ | ② | ① | ① |
| Not at all | 1-2 nights | Some nights | Most nights | Every night |
8. How often has your elbow pain interfered with your sleeping?

| | | | | |
|------------|--------------|------------------|------------------|-----------------|
| ④ | ③ | ② | ① | ① |
| Not at all | Occasionally | Some of the time | Most of the time | All of the time |
9. How much has your elbow problem interfered with your usual work or everyday activities?

| | | | | |
|------------|----------|------------|---------|---------|
| ④ | ③ | ② | ① | ① |
| Not at all | A little | Moderately | Greatly | Totally |
10. Has your elbow problem limited your ability to take part in leisure activities that you enjoy doing?

| | | | | |
|----------------|--------------|------------------|------------------|-----------------|
| ④ | ③ | ② | ① | ① |
| No, not at all | Occasionally | Some of the time | Most of the time | All of the time |
11. How would you describe the worst pain you have from your elbow?

| | | | | |
|---------|-----------|---------------|-------------|------------|
| ④ | ③ | ② | ① | ① |
| No pain | Mild pain | Moderate pain | Severe pain | Unbearable |
12. How would you describe the pain you usually have from your elbow?

| | | | | |
|---------|-----------|---------------|-------------|------------|
| ④ | ③ | ② | ① | ① |
| No pain | Mild pain | Moderate pain | Severe pain | Unbearable |
- Overall, how satisfied are you with the outcome of your elbow surgery?

| | | | | |
|----------------|--------------------|---------|-----------------------|--------------|
| ④ | ③ | ② | ① | ① |
| Very satisfied | Somewhat satisfied | Neutral | Somewhat dissatisfied | Dissatisfied |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 (MOxFAQ)

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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
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 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
16. During the past 4 weeks....
Have you been troubled by pain from your foot/ankle in bed at night?
- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Only 1 or 2 | | | | |
| No nights | nights | Some nights | Most nights | Every night |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Finally, please check that you have answered every 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.



| | |
|--|---|
| | <ul style="list-style-type: none"><input type="checkbox"/> I am able to engage in only a few of my usual recreation activities because of pain in my neck.<input type="checkbox"/> I can hardly do any recreation activities because of pain in my neck.<input type="checkbox"/> 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.

NEW ZEALAND JOINT REGISTRY

Established by the New Zealand Orthopaedic Association



Department of Orthopaedic Surgery and Musculoskeletal Medicine
Christchurch Hospital
Private Bag 4710
Christchurch 8140
E-mail: toni.hobbs@cdhb.health.nz

CONSENT FORM

- TO BE FILED IN PATIENT NOTES -

REQUEST FOR INTERPRETER

| English | I wish to have an interpreter | Yes | No |
|-------------|--|-----|-------|
| Maori | E hiahia ana ahau ki tetahi kaiwhakamaori/kaiwhaka pakeha korero | Ae | Kao |
| Samoan | Oute mana'o ia iai se fa'amatala upu | Ioe | Leai |
| Tongan | Oku ou fiema'u ha fakatonulea | Io | Ikai |
| Cook Island | Ka inangaro au I tetai tangata uri reo | Ae | Kare |
| Niuean | Fia manako au ke fakaaoga e taha tagata fakahokohoko kupu | E | Nakai |

The New Zealand Orthopaedic Association has a New Zealand Joint Registry which records the technical data on all artificial joint replacement surgery performed in New Zealand, eg, the different types of artificial joints implanted, whether cemented or not, how long the operation took, the need to use antibiotics. The Register will provide independent data on the performance of these artificial joints over many years. The data will be used in the future for an audit of joint replacement outcomes and will identify the factors which will provide the best long term surgical results for New Zealanders.

You are asked for your consent to allow your name, address, date of birth, national health index number along with the technical data on your joint surgery to be forwarded to the Registry.

We need this information in order to track the outcome over many years of your artificial joint replacement.

No other personal information will be entered without your written consent and it will not be possible to identify your name from any information taken from the data base for audit purposes.

If you wish to withdraw from the Register, you may do so by writing to the New Zealand Joint Registry, Department of Orthopaedic Surgery and Musculoskeletal Medicine, Christchurch Hospital. Withdrawing from the Register will not affect your current or future health care in any way.

Mr John McKie
Registry Supervisor

I consent to my name, address, date of birth, national health index number along with the technical data on my joint surgery being forwarded to the New Zealand Joint Registry.

SIGNED

DATE

NAME

PLEASE PRINT

APPENDIX 5 - DATA RELEASE FORM

NEW ZEALAND JOINT REGISTRY

Established by the New Zealand Orthopaedic Association



DATA RELEASE FORM

SECTION ONE

| | |
|---------------------|--------------------------|
| Requester: | Requesting Organisation: |
| Consultant Surgeon: | Other (specify status): |

SECTION TWO

Purpose for Data Request:

Eg Audit for Orthopaedic practice, Orthopaedic Department, Institution, Podium/Poster presentation, Publication, Other (specify above)

Date Required:

SECTION THREE - maximum of 100 words for each section

Research Project:

Hypothesis/aim:

Methodology:

Anticipated results:

Data required (as detailed as possible):

SECTION FOUR - PRINCIPAL INVESTIGATOR

| | |
|--------------------|-----------|
| Name: | Position: |
| Organisation/Unit: | |
| Signature: | Date: |

Names of other persons involved in the project - include position and attachment/s:

SECTION FIVE - GENERAL INFORMATION

Data Release Fee: Data released to an Orthopaedic Surgeon or his/her Registrar will be free but the NZJR reserves the right to charge an appropriate fee to other approved applicants. This will be advised prior to data release.

Statistical Analyses: It is recommended by the NZJR Board and the NZ Orthopaedic Association that any statistical analyses should be performed by the NZJR statistician, Associate Professor Chris Frampton, who can be contacted via statistecol@xtra.co.nz There will be a fee for this service.

Ethical Approval: It is the responsibility of the researcher/s to seek advice for and obtain, if necessary, ethical approval.

Acknowledgement: The NZJR must be acknowledged as the source of data in any publication, report or presentation in which NZJR data has comprised the basis of the project. A copy of published material must be supplied to the NZJR.

Department of Orthopaedic Surgery and Musculoskeletal Medicine, Christchurch Hospital, Private Bag 4710, Christchurch 8140

NEW ZEALAND JOINT REGISTRY

Established by the New Zealand Orthopaedic Association



DATA RELEASE FORM

DATA CONFIDENTIALITY: Any data provided to the Organisation that is not already in the public domain cannot be used in any advertising material, product promotion or external publication.

SECTION ONE

Requesting Organisation:

SECTION TWO

Purpose for Data Request eg audit for institution, regulatory process:

Date Required:

SECTION THREE

List details of specific data requested:

SECTION FOUR - PRINCIPAL INVESTIGATOR/CONTACT PERSON

Name:

Position:

Organisation/Unit:

Signature:

Date:

Names of other persons involved in the project - include position and attachment/s:

SECTION FIVE - GENERAL INFORMATION

Data Release Fee: Data released to an Orthopaedic Surgeon or his/her Registrar will be free but the NZJR reserves the right to charge an appropriate fee to other approved applicants. This will be advised prior to data release.

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