NEW ZEALAND ORTHOPAEDIC ASSOCIATION

THE NEW ZEALAND JOINT REGISTRY

THIRTEEN YEAR REPORT

JANUARY 1999 TO DECEMBER 2011

NZOA
New Zealand Orthopaedic Association

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EDITORIAL COMMENT

It is our pleasure to present the thirteen year report of the New Zealand Orthopaedic Associations New Zealand Joint Registry. Fortunately it has been a much quieter year earthquake wise but there has been some disruption from having to relocate to make way for a new hospital ward. .

The total number of registered joint arthroplasties at 31st of December 2011 was 165737 which had been performed on 120284 individual patients of which 116800 (13.97%) have died during the 13 year period. The number of observed component years (ocys) contained within the Registry has now reached well over 500,000. The increase of 16710 registered joints for 2011 compared to the 16517 in 2010 represents an overall annual gain of 1.2% which is the smallest gain since 2008.There were increased registrations for knee (2.7%), unicompartmental knees (0.3%) and shoulder (17%) and falls for hip (2%), ankle (12%) and elbow (9%) primary arthroplasty categories when compared to 2010. As for previous years analyses of revision data has been confined to primary registered arthroplasties.

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

There are 78283 hip arthroplasties in the Registry with an overall revision rate of 0.69 per 100 ocys with a 12 year prosthesis survival of 90.76%. The annual percentage of uncemented hip arthroplasties fell for the first time since the Registry began analysing data. The fall was from 52% of total in 2010 to 47.10% in 2011 with corresponding slight increases in fully cemented (13.8%) and hybrid (39.1%) athroplasties.

There has been a dramatic increase in the number of primary hip revisions with ALVAL *(*aseptic lymphocytic vascular-associated lesions) listed as the reason for revision. In 2011 the number increased from15 to72 and reflects the rising failure rate of metal on metal hip prosthesis combinations which have >36mm heads. Further increases are anticipated in the coming years.

As in previous years when the 3 types of hip fixation are analysed against the four age bands: under 55 years, 55-64 years, 65-74 years, and greater than 75 years, it shows that the uncemented arthroplasty has a significantly higher revision rate ($p<0.05$) in all except the under 55 age band. The data also shows that overall the hybrid hip has the lowest revision rate across the 4 age bands.

The KM curves for the 3 types of arthroplasty show that at twelve years prostheses survival is 91.66%, 90.76% and 91.16% respectively for cemented, uncemented and hybrid hips with a mean of 91.07% Last year it appeared the revision rate for uncemented hips was slowing in comparison to cemented hips but with more data available this trend is no longer apparent.

There are 1092 (832 in 2010) hip prosthesis combinations in the Registry; 532 (62%) have fewer than 10 registered procedures and 296 (27%) one only. The Corail/Pinnacle combination remains the most popular but the ExeterV40/Contempory combination has accumulated the most component years at 22264 from 4778 primary arthroplasties.

Revision rates for individual hip component combinations (minimum of 50 primary procedures) assembled in order of numbers of arthroplasties as well as revision rates have been calculated. In addition, tables listing combinations by fixation method have been added to make it easier for readers to determine the combination options used within the 3 types of prosthesis fixation. Six combinations which are still currently being used have revision rates significantly higher ($p<0.05$) than the overall rate of 0.69/100 ocys. The Twinsys uncemented/Selexys was the only combination in the top ten for 2011. This year revision rates for the individual femoral and acetabular components have not been included as the data can be misleading because revising a component does not necessarily indicate that it had failed or needed replacing.

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

The revision rates for the various bearing surfaces used in primary hip arthroplasty i.e. metal on plastic, metal on metal, ceramic on plastic, ceramic on metal, ceramic on ceramic have been further analysed this year with respect to head size. Head sizes >36mm (78% are metal on metal articulation) had a significantly higher revision rate at 2.22 compared to 0.72 for sizes 29-36 mm and 0.67/100ocys for <29mm. These findings are similar to those from other Registries. Across all bearing surface combinations the metal on plastic articulation still has a significantly lower revision rate than the other combinations.

Overall, however, the hip revision rate noted above and the twelve year prosthesis survival of 91.07% are among the best for similar national joint registries. A similar situation applies to knee prostheses with the overall revision rate 0.51/100 ocys, (95% confidence interval; 0.48-0.54) and the twelve year survival of 94.77%, again among the best for national joint registries. New Zealand surgeons can therefore be justifiably proud of these medium term trends.

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

The Insall/Burstein, Optetrak, Scorpio and LCS (despite overlap of CIs) prostheses have significantly higher revision rates than the overall rate of 0.51/100 ocys @ the 95% confidence interval. The Optetrak (30)and LCS(647)were the only ones implanted in 2011.

KM survival curves for six of the cemented knee prostheses with a minimum of 10 years of analysable data have been included for the first time. The Duracon has the highest and the LCS the lowest survival curve.

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

Image guidance (IG), first recorded by the registry in 2005, remains quite popular for primary knee arthroplasty and during 2011 was used in 14% of procedures. Comparison of revision rates for IG with non IG procedures demonstrates a rate of 0.61 versus 0.51/100 ocys. There is no statistical difference between the two at this early stage.

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

This year for the first time we have performed separate analyses for cruciate retaining versus posterior stabilised knee prostheses and have demonstrated that overall there are significantly higher revision rates for posterior stabilised prostheses.

There are 207 patello-femoral prostheses registered with 51 added in 2011, a 33% increase on 2010. Twelve (5.8%) have been revised.

With regard to unicompartmental knee arthroplasty there was a 0.3% increase in registrations compared to 2010. Once again the Oxford uncemented prosthesis was very dominant and furthermore it has a significantly lower revision rate (<half) compared to the overall mean and the cemented Oxford. The minimally invasive approach for the uni-compartmental knee arthroplasty remains popular and in 2011 was used in 30% of procedures.

Once again we have compared the deep infection revision rates within six months of the arthroplasty for primary hip and knee arthroplasty against the theatre environment. Six months has been chosen as infection within this time period is highly likely to have been introduced at the time of surgery. This year's analyses again demonstrate that for primary hip and knee arthroplasty there was 3 times the risk for revision for deep infection when the primary procedure was carried out in a laminar flow theatre with a space suit compared to a conventional theatre without a space suit. The use of space suits also significantly increases the risk of revision for deep infection in both conventional and laminar flow theatres. Last year there was again a slight drop in the percentage of arthroplasties performed in laminar flow theatres and the use of space suits.

Body mass index (BMI) data was again analysed for hip and knee patients with the mean BMI border line obesity (29, range 14-55, for hips & 31, range17-58, for knees) There were significant numbers of morbidly obese (BMI>40) people receiving arthroplasties.

The number of primary ankle arthroplasties increased by 109 in 2011 which was 14 fewer than the previous year. The Mobility/Salto ratio remains at 60:40 in favour of Mobility. The KM survival curve demonstrates a rather steep descent for years 4-7.

In the shoulder arthroplasty section, resurfacing arthroplasty has been further divided into partial and total which along with

hemi-arthroplasty makes 5 separate arthroplasty groups for analyses with respect to revision rates and Oxford scores. The SMR which is currently the most popular of the prosthesis options has significantly higher revision rates for the conventional, hemi and partial resurfacing versions. The conventional version has 4.5 times the revision rate of the long established Global prosthesis. There is also a significantly higher revision rate for Partial Resurfacing compared to the overall mean and all the other arthroplasty types. Registry data also confirms the high revision rate for the SMR L2 glenoid which has now been withdrawn by Lima.

Conventional Total and Resurfacing Head shoulder prostheses have significantly higher 6 month post arthroplasty Oxford scores.

Oxford 12 Questionnaire

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

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

In terms of using the Oxford scores as a screening tool for arthroplasty follow up it is worth noting that using 6 month data 70% of hip, 73% of knee and 72% of unicompartmental revisions within 2 years would have been captured by monitoring the lowest 30% of the Oxford scores. From the 5 year data, 74% of hip and 75% of knee revisions would have been captured by again monitoring the lowest 30% of the Oxford scores.

Deceased Person's Data.

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

Publications and Presentations

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

Alastair Rothwell	Toni Hobbs	Chris Frampton
Supervisor	Coordinator	Statistician

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for the website and other facilities

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For audit compliance information

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For continued monitoring and upgrading of data base software

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For Logo Design

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ORTHOPAEDIC SURGEONS

SOUTHERN CROSS HOSPITALS

WISHBONE TRUST

PARTICIPATING HOSPITALS

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

PUBLIC HOSPITALS

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Burwood Hospital
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Christchurch Hospital
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Dunedin Hospital
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Contact: Gretel McKenzie

Grey Base Hospital
Greymouth 7840
Contact: Arianne Go

Hawkes Bay Hospital
Hastings 4120
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Kenepuru Hospital
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Rob Champion

Manukau Surgery Centre
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Masterton Hospital
Masterton 5840
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Middlemore Hospital
Auckland 1640
Contact: Lalesh Deo

Nelson Hospital
Nelson 7040
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Northshore Hospital,
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Takapuna 0740
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Ormiston Hospital
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New Plymouth 4342
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Tauranga Hospital
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Contact: David Nyhoff

Timaru Hospital
Timaru 7940
Contact: Destiny Templeton-Wolfe

Waikato Hospital
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Wanganui Hospital
Wanganui
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Wairau Hospital
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Wellington Hospital
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Contact: Zoe Perkins

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Whangarei Area Hospital
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PRIVATE HOSPITALS

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Remuera 1050
Contact: Rodessa Flanagan or Margie Robertson

Belverdale Hospital
Wanganui 4500
Contact: Jane Young

Bidwill Trust Hospital
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Boulcott Hospital
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Contact: Karen Hall

Bowen Hospital
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Braemar Private Hospital
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Southern Cross Hospital
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Profile of the Average New Zealand Orthopaedic Surgeon*

From our analyses the average orthopaedic surgeon performed in 2011

- 37 Total hip arthroplasties — with 47% using uncemented,14% fully cemented and 39% hybrid prostheses: has a 91.07% survival at 12 years and a revision rate of 0.69 per 100 component years; 0.44% have been revised for deep infection; 85% at 6 months, 89% at five years and 87% at 10years had an excellent or good Oxford score.
- 32 Total knee arthroplasties — with almost all cemented but only 10 with patellae resurfaced; has a 94.77% survival at 12 years and a revision rate of 0.51 per 100 component years; 0.60% have been revised for deep infection; 73% at 6 months, 82% at 5 years and 80% at ten years had an excellent or good Oxford score.
- 8 Unicompartmental knee arthroplasties — with most cemented; has a 87.95% survival at 10 years and a revision rate of 1.31per 100 component years; 0.24% have been revised for deep infection; 81% at six months 88% at 5 years and 84% at ten years had an excellent or good Oxford score.
- 8 Shoulder arthroplasties — with a 2:1 split between total arthroplasty varieties and hemiarthroplasty; has a 93.90% survival at 8 years and a revision rate of 1.01 per 100 component years; 0.3% have been revised for deep infection; 64% at 6 months and 75% at 5 years had excellent or good Oxford derived scores.
- 7 Total ankle arthroplasties — mostly uncemented; 89.50% survival at 7years and a revision rate of 1.38per 100 component years; 0.3 % revised for deep infection; 56% at 6 months and 64% at 5 years had excellent or good Oxford derived scores.
- 2 Total elbow arthroplasties — most likely a cemented Coonrad-Morrey prosthesis; 93.73% survival at 4 years and a revision rate of 1.23 per 100 component years; 1.6% have been revised for deep infection; 70% at 6 months and 89% at 5 years had excellent or good Oxford derived scores.

*** averages derived from the number of surgeons recorded performing the above procedures during 2011 and not from the total pool of orthopaedic surgeons**.

DEVELOPMENT AND IMPLEMENTATION OF THE NEW ZEALAND JOINT REGISTRY

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

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

Administrative Network

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

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

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

Data Collection Forms

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

Data Base

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

Patient Generated Outcomes

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

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

Funding

Several sources of funding were investigated including contributions from the Ministry of Health, various funding agencies, medical insurance societies and an implant levy payable by surgeons and public hospitals to supplement a grant from the NZOA. In the early years the Registry had a "hand to mouth" existence relying on grants from the NZOA and Wishbone Trust until it received significant annual grants from the Accident Compensation Corporation. From 2002 funding became more reliable with the surgeons paying a $10 levy, increased to $15 in 2008, for each joint registered from a private hospital, and the Ministry of Health agreeing to pay $72,000 a year as part of the Government Joint Initiative. Since 2005 the Southern Cross Hospitals have contributed $10,000 annually.

Ethical Approval

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

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

Surgeon and Hospital Reports

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

Introduction of the Registry

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

Stage I November 1997 to March 1998

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

Stage II April 1998 to June 1998

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

Stage III July 1998 to March 1999

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

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

Stage IV April 1st 1999 the National Joint Registry became fully operational throughout New Zealand.

DEVELOPMENT SINCE THE INTRODUCTION OF THE REGISTRY

Inclusion of other joint replacement arthroplasties

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

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

Monitoring of Data Collection

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

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

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

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

Registered patient deaths are also obtained from the NZHIS.

Data Entry by Scanning

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

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

Staffing

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

The 2011 Registry staff are; Alastair Rothwell, Supervisor, Toni Hobbs, Coordinator, Pat Manning Secretary, Lynley Diggs, Anne McHugh and Tania Wright data processors.

Use of Registry Data

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

Registry Board

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

NUMBER OF JOINTS ANALYSED
1ST JANUARY 1999 – 31ST DECEMBER 2011

Numbers of procedures registered

	13 years	12 years	11 years	10 years	9 years	8 years	7years	1-6 years
Hips, primary	78283	71057	63681	56383	49374	42421	35998	29680
Hips, revision	11596	10463	9445	8405	7360	6383	5487	4570
Knees, primary	58496	52214	46093	40068	34458	28705	23565	18537
Knees, revision	4603	4159	3727	3293	2883	2499	2149	1736
Knees unicompartmental	6621	6035	5452	4826	4284	3709	3122	2565
Shoulders, primary	4083	3505	3013	2498	2044	1641	1275	982
Shoulders, revision	305	255	213	180	139	105	80	57
Elbows, primary	364	331	301	267	227	191	160	130
Elbows, revision	64	56	49	41	36	31	26	20
Ankles, primary	837	728	603	484	377	298	216	146
Ankles, revision	64	50	38	29	26	19	12	8
Lumbar Disc, primary	140	129	111	94	75	59	38	22
Lumbar Disc, revision	3	3	3					
Lumbar fusion, primary	109							
Cervical Disc, primary	168	122	95	57	31			
Cervical Disc, revision	1	1	1					
TOTAL	1657387	149027	132510	116625	101314	86061	72128	58,453

Bilateral joint replacements carried out under the same anaesthetic

Bilateral hips	1609 patients	(3218 hips)	4.0% of primary hips
Bilateral knees	2523 patients	(5046 knees)	9.0% of primary knees
Bilateral Unicompartmental knees	549 patients	(1098 knees)	17.0% of primary uni- knees
Bilateral ankles	2 patients	(4 ankles)	
Bilateral shoulders	4 patients	(8 shoulders)	

The percentages have remained essentially unchanged from the previous reports

During the 13 year period 120284 individual patients were registered of which (13.97%) have died.

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

HIP ARTHROPLASTY

PRIMARY HIP ARTHROPLASTY

The thirteen-year report analyses data for the period January 1999 – December 2011. There were 78,283 primary hip procedures registered including 1237 resurfacing arthroplasties. This is an additional 7,218 compared to last year's report.

1999	4114
2000	4715
2001	4932
2002	4830
2003	5058
2004	6029
2005	6320
2006	6430
2007	6962
2008	7002
2009	7306
2010	7367
2011	7218

There was a 2% decrease in hip registrations for 2011, which is the first annual decrease since 2002.

DATA ANALYSIS

Age and sex distribution
The average age for all patients with primary hip arthroplasty was 66.85 years, with a range of 15.43 – 100.95 years.

All hip arthroplasty

	Female	Male
Number	41221	37062
Percentage	52.66	47.34
Mean age	68.36	65.17
Maximum age	100.95	96.97
Minimum age	15.43	15.87
Standard dev.	11.67	11.51

Conventional hip arthroplasty

	Female	Male
Number	40969	36077
Percentage	53.17	46.83
Mean age	68.48	65.52
Maximum age	100.95	96.97
Minimum age	15.43	15.87
Standard dev.	11.60	11.37

Resurfacing hip arthroplasty

	Female	Male
Number	252	885
Percentage	20.37	79.63
Mean age	50.16	52.06
Maximum age	65.88	75.69
Minimum age	25.72	17.74
Standard dev.	7.19	8.57

A further 142 resurfacing hips were registered during 2011.

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

Body Mass Index
For the 2 year period 2010 - 2011, there were 5424 BMI registrations for primary hip replacements. The average was 28.61 with a range of 15.16 – 58.5 and a standard deviation of 5.54.

Previous operation

None	74718
Internal fixation	1653
Osteotomy	457
Internal fixation for SUFE	164
Arthroscopy/arthrotomy	86
Arthrodesis	68
Open reduction	52
Core decompression	41
Girdlestone	19
Other	144

Diagnosis

Osteoarthritis	68000
Acute fracture NOF	2779
Avascular necrosis	2453
Developmental dysplasia	2034
Rheumatoid arthritis	1162
Old fracture NOF	1023
Other inflammatory	689
Tumour	369
Post acute dislocation	255
Fracture acetabulum	153
Other	221

Approach

Posterior	49280
Lateral	21683
Anterior	3401
Minimally invasive	1434
Trochanteric osteotomy	157
Image guided surgery	199

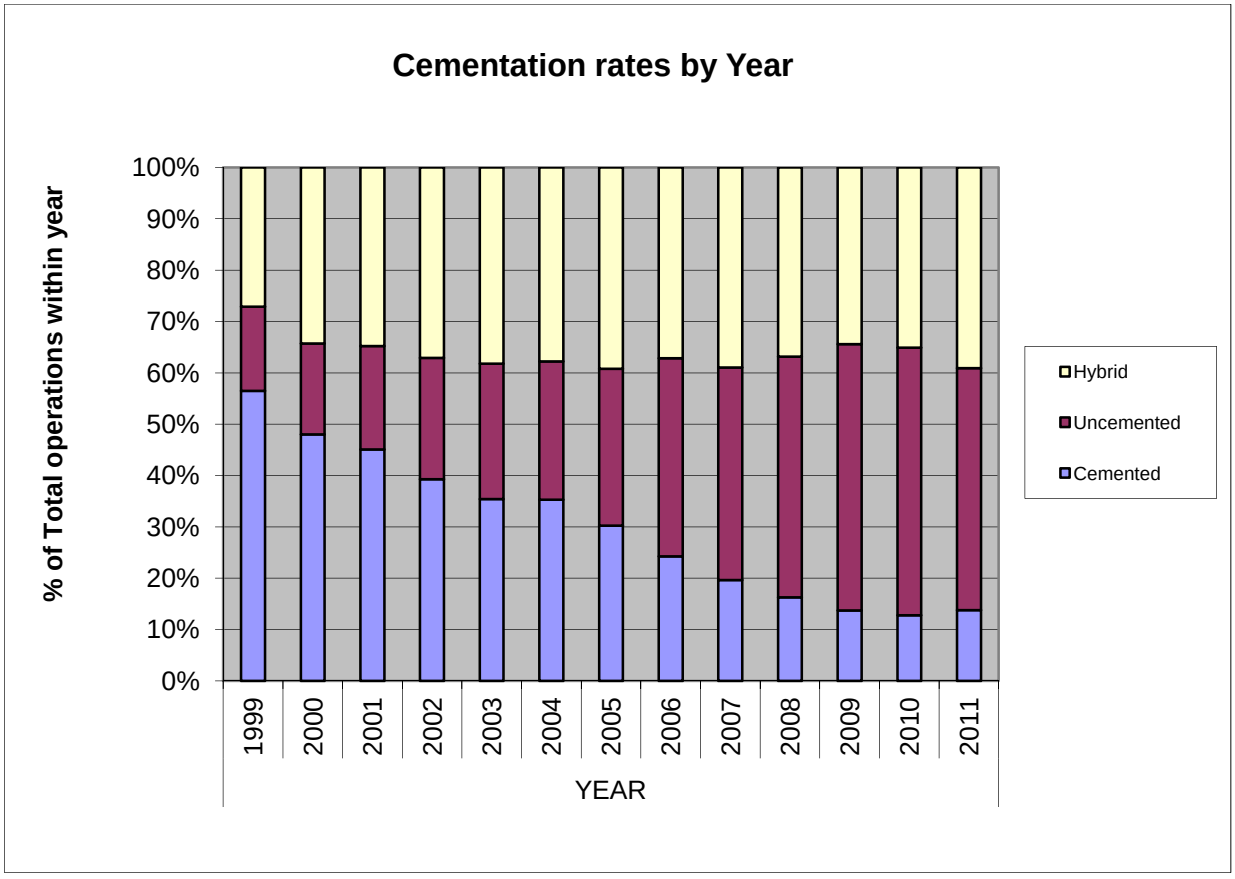
Image guided surgery was added to the updated forms at the beginning of 2005, but there continues to be little interest in the technique. The minimally invasive approach has also waned after a surge in 2008.

Bone graft

Femoral autograft	201
Femoral allograft	38
Femoral synthetic	5
Acetabular autograft	657
Acetabular allograft	93
Acetabular synthetic	4

Cement

Femur cemented	49937	(64%)
Antibiotic in cement	30184	(60%)
Acetabulum cemented	21932	(28%)
Antibiotic in cement	12910	(59%)



The proportion of uncemented arthroplasties fell from 52.10% in 2010 to 47.10% in 2011 with corresponding slight increases in fully cemented and hybrid athroplasties.

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 74970 (96%)

A cephalosporin was used in 88% of patients.

Operating theatre

Conventional	48240
Laminar flow	28774
Space suits	21638

ASA Class

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

Definitions

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

For the seven-year period 2005 – 2011, there were 45,020 (93%) primary hip procedures with the ASA class recorded.

ASA	Number	Percentage
1	8016	18
2	26466	59
3	10160	22
4	378	1

Operative time – skin to skin

Mean	80 minutes
Standard deviation	28 minutes
Minimum	24 minutes
Maximum	493 minutes

Prosthesis usage

Conventional primary hips

Top 10 femoral components used in 2011

Exeter V40	2360
TwinSys uncemented	766
Corail	684
CLS	399
Spectron	320
Synergy porous	279
CPT	210
TwinSys cemented	199
MS 30	187
C-Stem AMT	185

In 2011 the CPT and C-Stem components replaced the Accolade and Avenir Muller from 2010. There was no change in the order of the top six.

Top 10 acetabular components used in 2011

Pinnacle	1172
RM Pressfit cup	846
Continuum TM	699
Trident	588
Reflection porous	455
Tritanium	409
Trilogy	362
Fitmore	347
Contemporary	331
R3 porous	323

In 2011 the R3 porous component replaced the Selexys TPS. The main movers were Continuum TM and the Tritanium.

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the seven-year period 2005 – 2011.

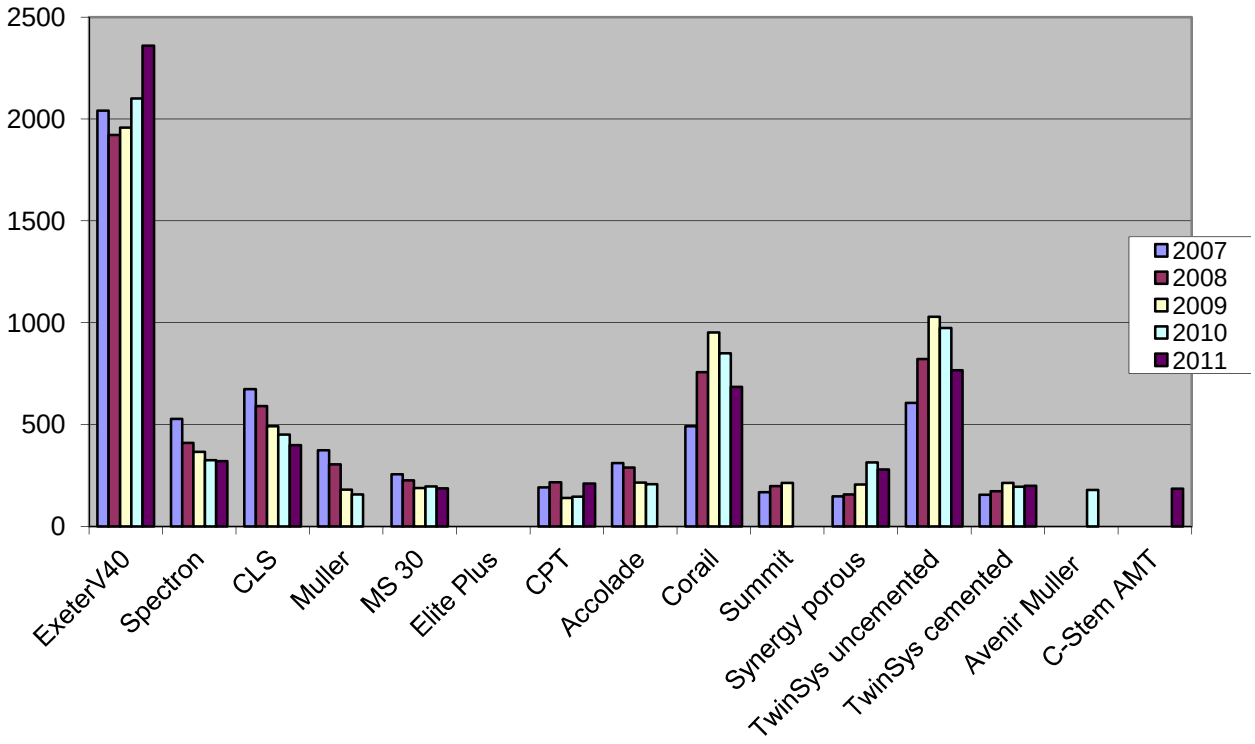
Consultant	41898
Advanced trainee supervised	3939
Advanced trainee unsupervised	1379
Basic trainee	1167

Top Ten Combinations used in 2011

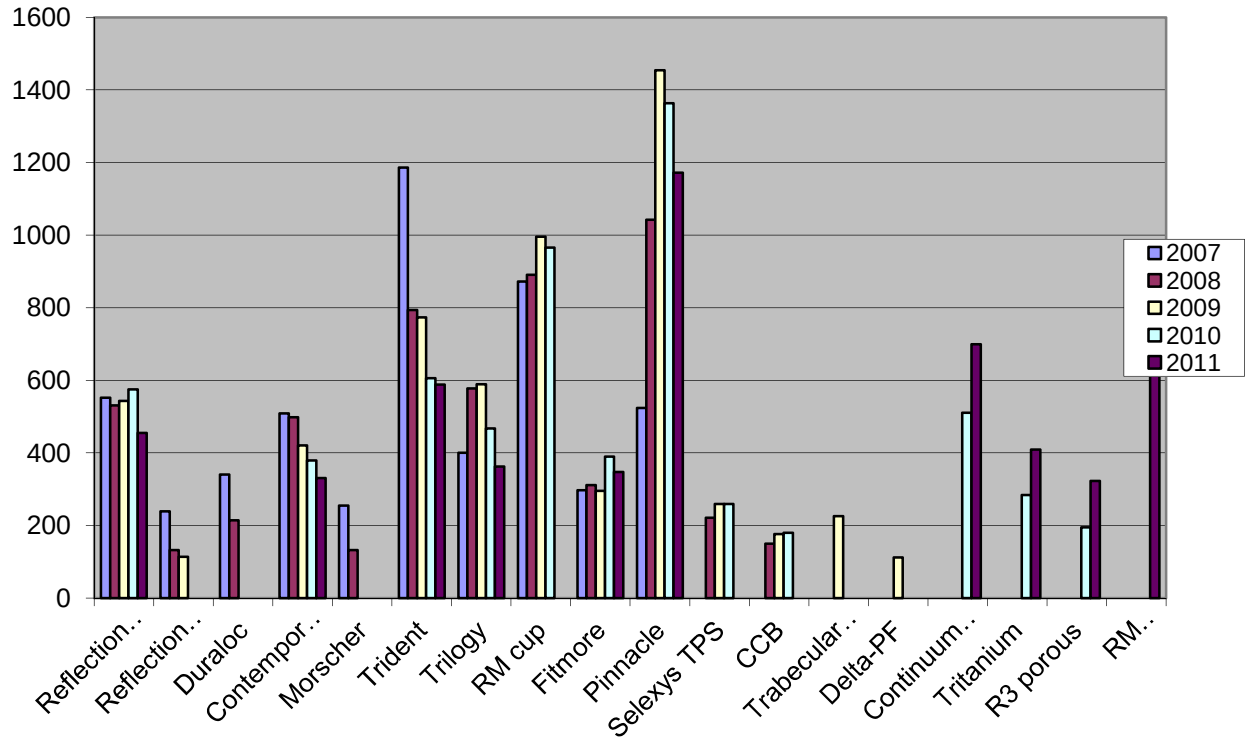
Corail/Pinnacle	574
Exeter V40/Trident	493
TwinSys uncemented/RM Pressfit cup	419
Exeter V40/Contemporary	316
Exeter V40/Pinnacle	239
Exeter V40/Continuum TM	226
Exeter V40/Tritanium	212
TwinSys uncemented/Selexys TPS	183
Exeter V40/Trilogy	171
Spectron/Reflection porous	169

The Exeter V40/Continuum TM has replaced the Synergy /Porous from the 2010 list.

Most Used Femoral Components 5 years 2007- 2011

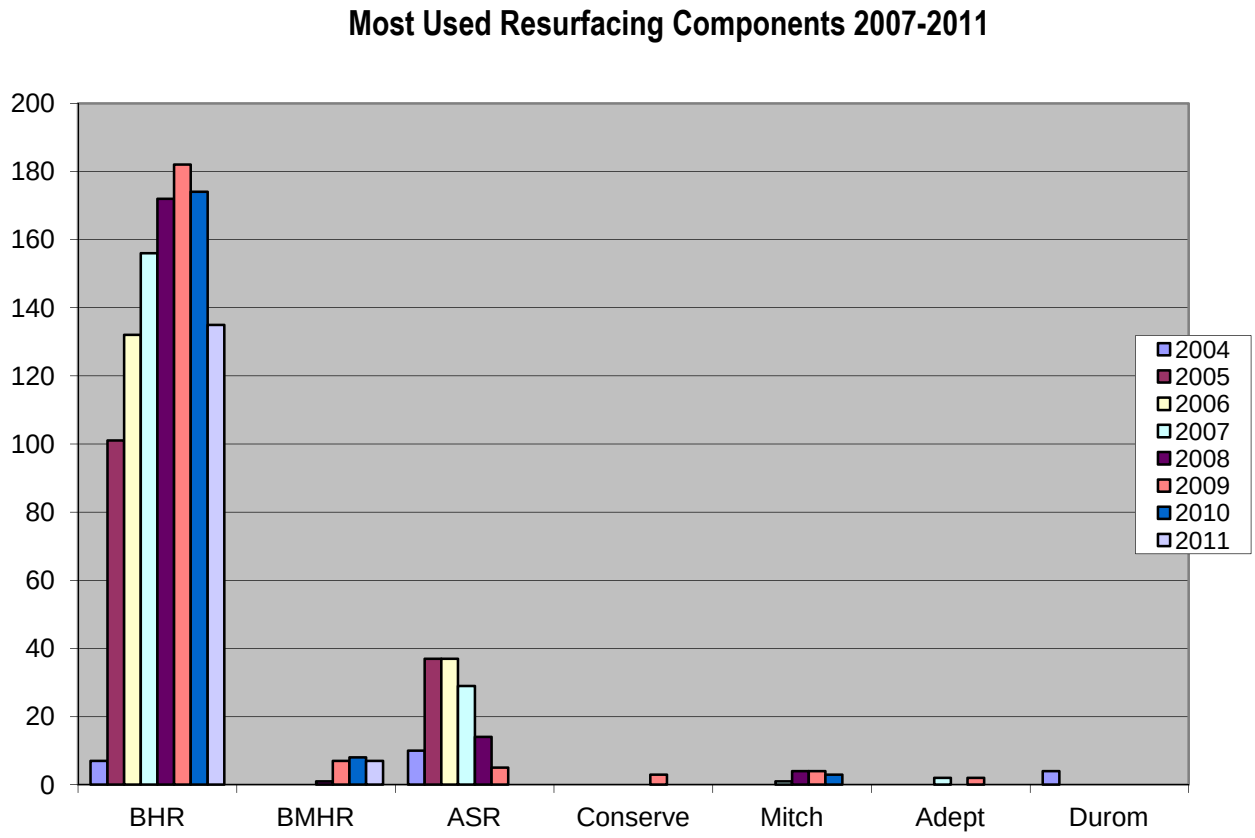


Most Used Acetabular Components 5 years 2007 -2011



Resurfacing hips components used in 2011

BHR	135
BMHR	7



Surgeon and hospital workload

Surgeons
In 2011, 196 surgeons performed 7,218 total hip replacements, an average of 37 procedures per surgeon.

31 surgeons performed less than 10 procedures and 49 performed more than 50.

Hospitals
In 2011, primary hip replacement was performed in 52 hospitals, 27 public and 25 private.

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

REVISION HIP ARTHROPLASTY

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

Data analysis

For the thirteen-year period January 1999 – December 2011, there were 11,596 revision hip procedures registered. This is an additional 1,133 compared to last year's report.

The average age for a revision hip replacement was 69.90 years, with a range of 17.52–97.72 years.

Revision hips

	Female	Male
Number	5647	5949
Percentage	48.70	51.30
Mean age	70.07	69.75
Maximum age	97.72	97.17
Minimum age	17.52	25.68
Standard dev.	12.11	10.84

The percentage of revision hips to primary hips is 13% or a ratio of 1:7.8

Body Mass Index

For the two year period 2010 - 2011, there were 542 BMI registrations for revision hip replacements. The average BMI was 29.09 with a range of 15- 55 with a standard deviation of 6.03.

REVISION OF REGISTERED PRIMARY HIP ARTHROPLASTIES

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

There were 2,790 revisions of the 77,046 primary conventional hip replacements (3.6%) and 41 revisions of the 1237 resurfacing hip replacements (3.3%), a total of 2831.

Conventional hip arthroplasty analyses

Time to revision for conventional hips

Mean	1366 days
Maximum	4656 days
Minimum	0 days
Standard deviation	1240 days

Reason for revision

Dislocation	804
Loosening acetabular component	651
Loosening femoral component	486
Deep infection	346
Pain	349
Fracture femur	267
Wear polyethylene	56
Osteolysis	43
Implant breakage	40
ALVAL*	72
Other	89

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

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

Analysis by time of the 6 main reasons for revision

		Years since operation													
		0	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	Count	382	113	72	57	33	40	33	24	21	4	13	6	6	804
	%	47.50	14.10	9.00	7.10	4.10	5.00	4.10	3.00	2.60	0.50	1.60	0.70	0.70	100.00
2	Count	102	53	52	53	48	44	63	50	53	64	34	27	8	651
	%	15.70	8.10	8.00	8.10	7.40	6.80	9.70	7.70	8.10	9.80	5.20	4.10	1.20	100.00
3	Count	58	49	47	44	41	44	55	43	35	31	23	13	3	486
	%	11.90	10.10	9.70	9.10	8.40	9.10	11.30	8.80	7.20	6.40	4.70	2.70	0.60	100.0
4	Count	116	68	52	24	22	16	15	9	9	7	6	2	0	346
	%	33.50	19.70	15.00	6.90	6.40	4.60	4.30	2.60	2.60	2.00	1.70	0.60	0.00	100.00
5	Count	45	67	48	38	17	23	24	14	19	20	17	14	3	349
	%	12.90	19.20	13.80	10.90	4.90	6.60	6.90	4.00	5.40	5.70	4.90	4.00	0.90	100.00
6	Count	118	20	24	16	22	18	8	10	11	11	5	3	1	267
	%	44.20	7.50	9.00	6.00	8.20	6.70	3.00	3.70	4.10	4.10	1.90	1.10	0.40	100.00

1 = Dislocation, 2 = Loosening acetabular component, 3 = Loosening femoral component. 4 = Deep Infection, 5 = Pain 6 = Fractured femur.

Resurfaced hip analyses

Time to revision for resurfaced hips

Mean	840 days
Maximum	2116 days
Minimum	10 days
Standard deviation	619 days

Total registered1237 and revised 41.

Reason for revision

Fracture femur/neck of femur	9
Deep infection	9
Loosening acetabular comp.	8
Loosening femoral component	5
Pain	8
Dislocation	1
ALVAL	5
Other	4

Statistical note

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

Observed component years

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

Rate/100 component years

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

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
77046	402309	2790	0.69	0.67	0.72

There are 1092 (832 in 2010) hip prosthesis combinations in the Registry; 532 (62%) have fewer than 10 registered procedures and 296 (27%) one only.

The tables below contain the analyses of the 175 that have a minimum of 50 primary registered procedures. As stated above it is important to note the confidence intervals and observed component years in conjunction with the revision rates.

Revisions versus Hip Prostheses Combinations Sorted on Number of Implantations

Minimum of 50 primary registered arthroplasties

Femur Prosthesis	Acetabular Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Exeter V40	Contemporary	4778	22264	100	0.45	0.37	0.55
Exeter V40	Trident	4651	19116	98	0.51	0.42	0.62
Corail	Pinnacle	3200	7887	63	0.80	0.61	1.02
Spectron	Reflection cemented	2925	21058	171	0.81	0.69	0.94
Spectron	Reflection porous	2722	139706	96	0.69	0.56	0.84
TwinSys uncemented	RM Pressfit cup	2554	6602	49	0.74	0.55	0.98
CLS	Fitmore	1814	10376	45	0.43	0.32	0.58
Accolade	Trident	1804	9242	64	0.69	0.53	0.88
CLS	Morscher	1682	12884	67	0.52	0.40	0.66
Exeter V40	Trilogy	1632	6705	34	0.51	0.35	0.71
Exeter	Contemporary	1551	14099	116	0.82	0.68	0.99
Exeter V40	Exeter	1515	8628	38	0.44	0.31	0.60
Muller	Muller PE cup	1353	9570	32	0.33	0.23	0.47
Exeter	Exeter	1326	11525	82	0.71	0.57	0.88
CLS	CLS Expansion	1259	9050	68	0.75	0.58	0.95
Spectron	Duraloc	1154	9466	98	1.04	0.84	1.26
TwinSys uncemented	Selexys TPS	1109	2819	34	1.21	0.84	1.69
Synergy Porous	Reflection porous	1058	4420	27	0.61	0.40	0.89
MS 30	Fitmore	1022	4659	13	0.28	0.15	0.48
Exeter V40	Duraloc	987	5892	45	0.76	0.56	1.02
Summit	Pinnacle	944	3193	31	0.97	0.66	1.38
Exeter V40	Pinnacle	904	1903	8	0.42	0.18	0.83
Muller	RM cup	858	5659	40	0.71	0.50	0.96
Exeter	Osteolock	836	7862	45	0.57	0.42	0.77
MS 30	Morscher	787	6093	43	0.71	0.51	0.95
Exeter V40	RM Pressfit cup	710	1968	7	0.36	0.14	0.73
CLS	Duraloc	699	5627	48	0.85	0.63	1.13
CCA	CCB	649	3273	12	0.37	0.19	0.64
Exeter V40	Morscher	630	3842	21	0.55	0.34	0.84
CPT	Trilogy	621	2572	27	1.05	0.69	1.53
Elite plus	Duraloc	608	4397	58	1.32	1.00	1.71

Exeter	Duraloc	553	5487	47	0.86	0.63	1.14
Exeter	Morscher	551	5550	25	0.45	0.29	0.67
TwinSys cemented	RM Pressfit cup	545	1387	4	0.29	0.08	0.74
CPT	ZCA	525	3669	17	0.46	0.27	0.74
Exeter V40	Reflection cemented	476	1636	5	0.31	0.10	0.71
Corail	Duraloc	464	2634	18	0.68	0.41	1.08
MUller	Muller PE cup	464	3544	17	0.48	0.28	0.77
MS 30	Muller PE cup	462	3218	13	0.40	0.22	0.69
Charnley	Charnley	456	3667	12	0.33	0.17	0.57
Exeter V40	Continuum TM	403	3689	6	1.63	0.60	3.54
Exeter V40	Tritanium	397	389	5	1.29	0.42	3.00
Versys cemented	ZCA	391	2720	16	0.59	0.34	0.96
C-Stem AMT	Pinnacle	359	631	3	0.48	0.10	1.39
Exeter V40	Reflection porous	355	1349	7	0.52	0.21	1.07
ABGII	Trident	342	2001	19	0.95	0.57	1.48
CLS	Trilogy	342	1152	8	0.69	0.30	1.37
Synergy Porous	R3 porous	342	458	6	1.31	0.48	2.85
CLS	RM Pressfit cup	311	961	5	0.52	0.17	1.21
Charnley	Charnley Cup Ogee	303	2617	12	0.46	0.24	0.80
Elite plus	Charnley	298	2727	16	0.59	0.34	0.95
S-Rom	Pinnacle	289	1561	13	0.83	0.44	1.42
Muller	Weber	285	1716	3	0.17	0.04	0.51
Elite plus	Elite Plus LPW	282	2130	8	0.38	0.16	0.74
Versys	Trilogy	273	2427	13	0.54	0.29	0.92
Exeter V40	Osteolock	270	2006	9	0.45	0.21	0.85
TwinSys uncemented	Delta-PF Cup	270	559	1	0.18	0.00	1.00
Exeter V40	CCB	266	644	2	0.31	0.04	1.12
CLS	Reflection porous	264	1042	10	0.96	0.46	1.77
Exeter V40	Fitmore	263	831	2	0.24	0.03	0.87
TwinSys cemented	CCB	254	568	2	0.35	0.04	1.27
Versys cemented	Trilogy	235	1722	6	0.35	0.13	0.76
Exeter	Trilogy	213	2006	12	0.60	0.31	1.05
CPT	Duraloc	212	1667	8	0.48	0.21	0.95
Spectron	Morscher	210	1872	13	0.69	0.37	1.19
TwinSys uncemented	Trilogy	209	498	6	1.20	0.44	2.62
Muller	RM Pressfit cup	201	790	1	0.13	0.00	0.70
CLS	Durom	198	895	13	1.45	0.77	2.48
CLS	Allofit	192	804	8	1.00	0.43	1.96
CBC Stem	RM Pressfit cup	184	653	9	1.38	0.63	2.62
CBC Stem	Expansys shell	183	854	13	1.52	0.81	2.60
Accolade	Pinnacle	180	455	2	0.44	0.05	1.59
C-Stem AMT	Marathon cemented	179	2605	2	0.77	0.09	2.78
Exeter V40	Exeter X3	176	102	0	0.00	0.00	3.61
MUller	RM cup	168	1364	11	0.81	0.40	1.44
Femoral Stem Press Fit	Continuum TM	165	198	4	2.02	0.55	5.18
Friendly	Delta-PF Cup	159	613	2	0.33	0.04	1.18

CLS	Trident	157	994	9	0.91	0.41	1.72
Corail	ASR	156	639	25	3.91	2.53	5.78
Spectron	Mallory-Head	152	1021	6	0.59	0.22	1.28
MS 30	Trilogy	149	533	3	0.56	0.12	1.64
Omnifit	Trident	149	974	10	1.03	0.49	1.89
TwinSys cemented	RM cup	148	626	4	0.64	0.17	1.64
CPT	Trident	145	762	7	0.92	0.37	1.89
Spectron	R3 porous	144	152	3	1.97	0.41	5.77
Corail	Reflection porous	140	502	1	0.20	0.01	1.11
ABGII	Duraloc	139	1223	16	1.31	0.75	2.12
Corail	Ultima	135	789	3	0.38	0.08	1.11
Muller	ZCA	132	301	1	0.33	0.01	1.85
CCA	RM Pressfit cup	131	638	3	0.47	0.10	1.37
S-Rom	ASR	130	497	50	10.06	7.47	13.27
CLS	Continuum TM	129	121	2	1.65	0.20	5.98
Exeter	CLS Expansion	129	1202	7	0.58	0.23	1.20
Polarstem uncemented	Reflection porous	129	134	5	3.73	1.21	8.70
Femoral Stem Press Fit	Trilogy	128	342	2	0.58	0.07	2.11
MS 30	Contemporary	128	784	5	0.64	0.21	1.49
CPT	Continuum TM	127	91	2	2.21	0.27	7.99
FTC	DeltaMotion Cup	126	236	1	0.42	0.01	2.37
Exeter V40	Monoblock Acetabular Cup	123	908	5	0.55	0.18	1.29
TwinSys uncemented	RM cup	121	259	2	0.77	0.09	2.79
Exeter	Muller PE cup	119	1096	2	0.18	0.02	0.66
ABG	Duraloc	116	1319	13	0.99	0.52	1.69
Summit	Trilogy	115	404	4	0.99	0.27	2.54
Accolade	Muller PE cup	114	708	1	0.14	0.00	0.79
CLS	RM cup	113	582	9	1.55	0.71	2.94
Exeter	Bio-clad poly	113	1000	6	0.60	0.22	1.31
Prodigy	Duraloc	113	1052	10	0.95	0.46	1.75
Synergy Porous	BHR Acetabular Cup	112	418	6	1.44	0.53	3.13
Muller	Trilogy	111	319	3	0.94	0.19	2.75
Elite plus	Elite Plus Ogee	110	821	3	0.37	0.08	1.07
ABGII	Delta-PF Cup	107	650	6	0.92	0.34	2.01
CLS	Weill ring	106	992	6	0.60	0.22	1.32
Avenir Muller uncemented	RM cup	105	157	1	0.64	0.02	3.55
Mallory-Head	M2A	105	643	6	0.93	0.34	2.03
Trabecular Metal Stem	Continuum TM	103	119	3	2.53	0.52	7.39
Basis	Reflection porous	101	223	1	0.45	0.01	2.50
Summit	Duraloc	101	613	4	0.65	0.18	1.67
Avenir Muller uncemented	Pinnacle	99	148	1	0.67	0.02	3.76
Exeter V40	Bio-clad poly	96	383	2	0.52	0.06	1.88
Corail	Monoblock Acetabular Cup	95	347	4	1.15	0.31	2.95
Exeter V40	Trabecular Metal Shell	94	220	5	2.28	0.74	5.32
Lateral straight stem	Muller PE cup	94	620	2	0.32	0.04	1.17
Anthology	BHR Acetabular	93	241	2	0.83	0.10	3.00

Porous	Cup						
Accolade	Tritanium	92	76	0	0.00	0.00	4.92
Avenir Muller uncemented	Continuum TM	92	93	2	2.15	0.26	7.78
Exeter V40	Muller PE cup	92	541	3	0.55	0.11	1.62
Exeter V40	CLS Expansion	88	612	0	0.00	0.00	0.60
H-Max S	Delta-TT Cup	88	51	1	1.97	0.05	10.97
Summit	ASR	88	345	13	3.77	2.01	6.45
Avenir Muller uncemented	Tritanium	87	61	0	0.00	0.00	6.07
CPT	Monoblock Acetabular Cup	84	481	6	1.25	0.46	2.71
Exeter	Trident	84	772	0	0.00	0.00	0.48
CLS	Monoblock Acetabular Cup	80	369	3	0.81	0.17	2.38
Corail	Delta-PF Cup	78	380	1	0.26	0.01	1.46
H-Max M	Delta-TT Cup	78	101	1	0.99	0.03	5.52
MS 30	RM Pressfit cup	78	332	1	0.30	0.01	1.68
S-Rom	Ultima	78	773	4	0.52	0.14	1.32
Spectron	Fitmore	78	673	3	0.45	0.09	1.30
Spectron	Trident	78	522	3	0.57	0.12	1.68
MUller	Weber	77	609	1	0.16	0.00	0.91
CPT	Fitmore	75	260	5	1.92	0.62	4.49
AML MMA	Duraloc	74	653	6	0.92	0.34	2.00
CCA	Contemporary	74	655	10	1.53	0.73	2.81
Muller	Trident	74	383	2	0.52	0.06	1.89
Trabecular Metal Stem	Monoblock Acetabular Cup	74	332	3	0.90	0.19	2.64
Synergy Porous	Delta-PF Cup	73	195	0	0.00	0.00	1.89
ABG	ABGII	72	788	10	1.27	0.61	2.33
Contemporary	Contemporary	71	685	8	1.17	0.50	2.30
H-Max M	Delta-PF Cup	71	105	2	1.91	0.23	6.89
TwinSys uncemented	Continuum TM	71	67	2	3.01	0.36	10.87
Lateral straight stem	Weber	68	420	5	1.19	0.39	2.78
Spectron	Biomex acet shell porous	68	650	1	0.15	0.00	0.86
ABGII	Pinnacle	67	219	2	0.92	0.11	3.31
Spectron	Muller PE cup	66	503	4	0.80	0.22	2.04
MS 30	Continuum TM	64	61	1	1.65	0.04	9.17
Anthology Porous	R3 porous	63	163	0	0.00	0.00	2.26
Corail	Trilogy	61	82	0	0.00	0.00	4.48
CLS	Pinnacle	60	152	0	0.00	0.00	2.42
CLS	Artek	59	504	18	3.57	2.12	5.64
CPT	Pinnacle	58	172	2	1.16	0.14	4.20
CPT	Tritanium	58	80	3	3.74	0.77	10.92
Exeter V40	R3 porous	58	49	1	2.02	0.05	11.27
Furlong	Furlong cup	57	383	4	1.04	0.28	2.67
Muller	Duraloc	57	512	5	0.98	0.32	2.28
CBC Stem	Fitmore	56	219	3	1.37	0.28	4.01
C-Stem	Elite Plus Ogee	55	369	2	0.54	0.07	1.96
MS 30	Duraloc	55	556	5	0.90	0.29	2.10
Wagner cone stem	Fitmore	55	401	2	0.50	0.06	1.80
Polarstem uncemented	R3 porous	54	40	0	0.00	0.00	9.32

AML	Duraloc	53	511	2	0.39	0.05	1.42
C-Stem	Duraloc	53	415	4	0.96	0.26	2.47
Evolutis	DeltaMotion Cup	53	25	0	0.00	0.00	14.86
Exeter V40	Weber	53	343	0	0.00	0.00	1.08
Exeter V40	ZCA	53	280	1	0.36	0.01	1.99
Muller	Continuum TM	51	35	2	5.73	0.69	20.70
Muller	CLS Expansion	50	217	3	1.38	0.28	4.04

Revisions versus Hip Prostheses Combinations Sorted on Revision Rate.

Minimum of 50 primary registered arthroplasties

Femur Prosthesis	Acetabular Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
*S-Rom	ASR	130	497	50	10.06	7.47	13.27
Muller	Continuum TM	51	35	2	5.73	0.69	20.70
*Corail	ASR	156	639	25	3.91	2.53	5.78
*Summit	ASR	88	345	13	3.77	2.01	6.45
*#CPT	Tritanium	58	80	3	3.74	0.77	10.92
*#Polarstem uncemented	Reflection porous	129	134	5	3.73	1.21	8.70
*CLS	Artek	59	504	18	3.57	2.12	5.64
TwinSys uncemented	Continuum TM	71	67	2	3.01	0.36	10.87
Trabecular Metal Stem	Continuum TM	103	119	3	2.53	0.52	7.39
*#Exeter V40	Trabecular Metal Shell	94	220	5	2.28	0.74	5.32
CPT	Continuum TM	127	90	2	2.21	0.27	7.99
Avenir Muller uncemented	Continuum TM	92	93	2	2.15	0.26	7.78
Exeter V40	R3 porous	58	49	1	2.02	0.05	11.27
Femoral Stem Press Fit	Continuum TM	165	198	4	2.02	0.55	5.18
Spectron	R3 porous	144	152	3	1.97	0.41	5.77
H-Max S	Delta-TT Cup	88	51	1	1.97	0.05	10.97
CPT	Fitmore	75	260	5	1.92	0.62	4.49
H-Max M	Delta-PF Cup	71	105	2	1.91	0.23	6.89
CLS	Continuum TM	129	121	2	1.65	0.20	5.98
MS 30	Continuum TM	64	61	1	1.65	0.04	9.17
Exeter V40	Continuum TM	403	369	6	1.63	0.60	3.54
CLS	RM cup	113	582	9	1.55	0.71	2.94
*#CCA	Contemporary	74	655	10	1.53	0.73	2.81
*#CBC Stem	Expansys shell	183	854	13	1.52	0.81	2.60
*CLS	Durom	198	895	13	1.45	0.77	2.48
Synergy Porous	BHR Acetabular Cup	112	418	6	1.44	0.53	3.13
Muller	CLS Expansion	50	217	3	1.38	0.28	4.04
CBC Stem	RM Pressfit cup	184	653	9	1.38	0.63	2.62
CBC Stem	Fitmore	56	219	3	1.37	0.28	4.01
*Elite plus	Duraloc	608	4397	58	1.32	1.00	1.71
Synergy Porous	R3 porous	342	458	6	1.31	0.48	2.85
*ABGII	Duraloc	139	1223	16	1.31	0.75	2.12
Exeter V40	Tritanium	397	389	5	1.29	0.42	3.00
ABG	ABGII	72	788	10	1.27	0.61	2.33

CPT	Monoblock Acetabular Cup	84	481	6	1.25	0.46	2.71
*#TwinSys uncemented	Selexys TPS	1109	2819	34	1.21	0.84	1.69
TwinSys uncemented	Trilogy	209	498	6	1.20	0.44	2.62
Lateral straight stem	Weber	68	420	5	1.19	0.39	2.78
Contemporary	Contemporary	71	685	8	1.17	0.50	2.30
CPT	Pinnacle	58	172	2	1.16	0.14	4.20
Corail	Monoblock Acetabular Cup	95	347	4	1.15	0.31	2.95
CPT	Trilogy	621	2572	27	1.05	0.69	1.53
Furlong	Furlong cup	57	383	4	1.04	0.28	2.67
*Spectron	Duraloc	1154	9465	98	1.04	0.84	1.26
Omnifit	Trident	149	974	10	1.03	0.49	1.89
CLS	Allofit	192	804	8	1.00	0.43	1.96
Summit	Trilogy	115	404	4	0.99	0.27	2.54
H-Max M	Delta-TT Cup	78	101	1	0.99	0.03	5.52
ABG	Duraloc	116	1319	13	0.99	0.52	1.69
Muller	Duraloc	57	512	5	0.98	0.32	2.28
Summit	Pinnacle	944	3193	31	0.97	0.66	1.38
C-Stem	Duraloc	53	415	4	0.96	0.26	2.47
CLS	Reflection porous	264	1042	10	0.96	0.46	1.77
Prodigy	Duraloc	113	1052	10	0.95	0.46	1.75
ABGII	Trident	342	2001	19	0.95	0.57	1.48
Muller	Trilogy	111	319	3	0.94	0.19	2.75
Mallory-Head	M2A	105	643	6	0.93	0.34	2.03
ABGII	Delta-PF Cup	107	650	6	0.92	0.34	2.01
AML MMA	Duraloc	74	653	6	0.92	0.34	2.00
CPT	Trident	145	762	7	0.92	0.37	1.89
ABGII	Pinnacle	67	219	2	0.92	0.11	3.31
CLS	Trident	157	994	9	0.91	0.41	1.72
Trabecular Metal Stem	Monoblock Acetabular Cup	74	332	3	0.90	0.19	2.64
MS 30	Duraloc	55	556	5	0.90	0.29	2.10
Exeter	Duraloc	553	5487	47	0.86	0.63	1.14
CLS	Duraloc	699	5627	48	0.85	0.63	1.13
S-Rom	Pinnacle	289	1560	13	0.83	0.44	1.42
Anthology Porous	BHR Acetabular Cup	93	241	2	0.83	0.10	3.00
Exeter	Contemporary	1551	14100	116	0.82	0.68	0.99
CLS	Monoblock Acetabular Cup	80	369	3	0.81	0.17	2.38
Spectron	Reflection cemented	2925	21058	171	0.81	0.69	0.94
MUller	RM cup	168	1364	11	0.81	0.40	1.44
Corail	Pinnacle	3200	7887	63	0.80	0.61	1.02
Spectron	Muller PE cup	66	503	4	0.80	0.22	2.04
TwinSys uncemented	RM cup	121	259	2	0.77	0.09	2.79
C-Stem AMT	Marathon cemented	179	260	2	0.77	0.09	2.78
Exeter V40	Duraloc	987	5892	45	0.76	0.56	1.02
CLS	CLS Expansion	1259	9050	68	0.75	0.58	0.95
TwinSys uncemented	RM Pressfit cup	2554	6602	49	0.74	0.55	0.98
Exeter	Exeter	1326	11525	82	0.71	0.57	0.88
Muller	RM cup	858	5659	40	0.71	0.50	0.96

MS 30	Morscher	787	6092	43	0.71	0.51	0.95
Spectron	Morscher	210	1872	13	0.69	0.37	1.19
CLS	Trilogy	342	1152	8	0.69	0.30	1.37
Accolade	Trident	1804	9242	64	0.69	0.53	0.88
Spectron	Reflection porous	2722	13970	96	0.69	0.56	0.84
Corail	Duraloc	464	2634	18	0.68	0.41	1.08
Avenir Muller uncemented	Pinnacle	99	148	1	0.67	0.02	3.76
Summit	Duraloc	101	613	4	0.65	0.18	1.67
TwinSys cemented	RM cup	148	626	4	0.64	0.17	1.64
Avenir Muller uncemented	RM cup	105	157	1	0.64	0.02	3.55
MS 30	Contemporary	128	784	5	0.64	0.21	1.49
Synergy Porous	Reflection porous	1058	4420	27	0.61	0.40	0.89
CLS	Weill ring	106	992	6	0.60	0.22	1.32
Exeter	Bio-clad poly	113	1000	6	0.60	0.22	1.31
Exeter	Trilogy	213	2006	12	0.60	0.31	1.05
Versys cemented	ZCA	391	2720	16	0.59	0.34	0.96
Spectron	Mallory-Head	152	1021	6	0.59	0.22	1.28
Elite plus	Charnley	298	2727	16	0.59	0.34	0.95
Femoral Stem Press Fit	Trilogy	128	342	2	0.58	0.07	2.11
Exeter	CLS Expansion	129	1202	7	0.58	0.23	1.20
Spectron	Trident	78	522	3	0.57	0.12	1.68
Exeter	Osteolock	836	7862	45	0.57	0.42	0.77
MS 30	Trilogy	149	533	3	0.56	0.12	1.64
Exeter V40	Muller PE cup	92	541	3	0.55	0.11	1.62
Exeter V40	Monoblock Acetabular Cup	123	908	5	0.55	0.18	1.29
Exeter V40	Morscher	630	3842	21	0.55	0.34	0.84
C-Stem	Elite Plus Ogee	55	369	2	0.54	0.07	1.96
Versys	Trilogy	273	2427	13	0.54	0.29	0.92
Muller	Trident	74	383	2	0.52	0.06	1.89
Exeter V40	Bio-clad poly	96	383	2	0.52	0.06	1.88
CLS	RM Pressfit cup	311	961	5	0.52	0.17	1.21
CLS	Morscher	1682	12884	67	0.52	0.40	0.66
Exeter V40	Reflection porous	355	1349	7	0.52	0.21	1.07
S-Rom	Ultima	78	773	4	0.52	0.14	1.32
Exeter V40	Trident	4651	19116	98	0.51	0.42	0.62
Exeter V40	Trilogy	1632	6705	34	0.51	0.35	0.71
Wagner cone stem	Fitmore	55	401	2	0.50	0.06	1.80
CPT	Duraloc	212	1667	8	0.48	0.21	0.95
MUller	Muller PE cup	464	3544	17	0.48	0.28	0.77
C-Stem AMT	Pinnacle	359	631	3	0.48	0.10	1.39
CCA	RM Pressfit cup	131	638	3	0.47	0.10	1.37
CPT	ZCA	525	3669	17	0.46	0.27	0.74
Charnley	Charnley Cup Ogee	303	2616	12	0.46	0.24	0.80
Exeter	Morscher	551	5550	25	0.45	0.29	0.67
Basis	Reflection porous	101	223	1	0.45	0.01	2.50
Exeter V40	Contemporary	4778	22263	100	0.45	0.37	0.55
Exeter V40	Osteolock	270	2006	9	0.45	0.21	0.85
Spectron	Fitmore	78	673	3	0.45	0.09	1.30
Exeter V40	Exeter	1515	8628	38	0.44	0.31	0.60
Accolade	Pinnacle	180	455	2	0.44	0.05	1.59

CLS	Fitmore	1814	10376	45	0.43	0.32	0.58
FTC	DeltaMotion Cup	126	236	1	0.42	0.01	2.37
Exeter V40	Pinnacle	904	1903	8	0.42	0.18	0.83
MS 30	Muller PE cup	462	3218	13	0.40	0.22	0.69
AML	Duraloc	53	511	2	0.39	0.05	1.42
Corail	Ultima	135	790	3	0.38	0.08	1.11
Elite plus	Elite Plus LPW	282	2130	8	0.38	0.16	0.74
CCA	CCB	649	3273	12	0.37	0.19	0.64
Elite plus	Elite Plus Ogee	110	821	3	0.37	0.08	1.07
Exeter V40	ZCA	53	280	1	0.36	0.01	1.99
Exeter V40	RM Pressfit cup	710	1968	7	0.36	0.14	0.73
TwinSys cemented	CCB	254	568	2	0.35	0.04	1.27
Versys cemented	Trilogy	235	1722	6	0.35	0.13	0.76
Muller	Muller PE cup	1353	9570	32	0.33	0.23	0.47
Muller	ZCA	132	301	1	0.33	0.01	1.85
Charnley	Charnley	456	3667	12	0.33	0.17	0.57
Friendly	Delta-PF Cup	159	613	2	0.33	0.04	1.18
Lateral straight stem	Muller PE cup	94	620	2	0.32	0.04	1.17
Exeter V40	CCB	266	644	2	0.31	0.04	1.12
Exeter V40	Reflection cemented	476	1636	5	0.31	0.10	0.71
MS 30	RM Pressfit cup	78	332	1	0.30	0.01	1.68
TwinSys cemented	RM Pressfit cup	545	1387	4	0.29	0.08	0.74
MS 30	Fitmore	1022	4659	13	0.28	0.15	0.48
Corail	Delta-PF Cup	78	380	1	0.26	0.01	1.46
Exeter V40	Fitmore	263	831	2	0.24	0.03	0.87
Corail	Reflection porous	140	502	1	0.20	0.01	1.11
Exeter	Muller PE cup	119	1096	2	0.18	0.02	0.66
TwinSys uncemented	Delta-PF Cup	270	559	1	0.18	0.00	1.00
Muller	Weber	285	1716	3	0.17	0.04	0.51
MUller	Weber	77	609	1	0.16	0.00	0.91
Spectron	Biomex acet shell porous	68	650	1	0.15	0.00	0.86
Accolade	Muller PE cup	114	707	1	0.14	0.00	0.79
Muller	RM Pressfit cup	201	790	1	0.13	0.00	0.70
Exeter V40	Exeter X3	176	102	0	0.00	0.00	3.61
Accolade	Tritanium	92	75	0	0.00	0.00	4.92
Exeter V40	CLS Expansion	88	612	0	0.00	0.00	0.60
Avenir Muller uncemented	Tritanium	87	61	0	0.00	0.00	6.07
Exeter	Trident	84	771	0	0.00	0.00	0.48
Synergy Porous	Delta-PF Cup	73	195	0	0.00	0.00	1.89
Anthology Porous	R3 porous	63	163	0	0.00	0.00	2.26
Corail	Trilogy	61	82	0	0.00	0.00	4.48
CLS	Pinnacle	60	152	0	0.00	0.00	2.42
Polarstem uncemented	R3 porous	54	40	0	0.00	0.00	9.32
Evolutis	DeltaMotion Cup	53	25	0	0.00	0.00	14.86
Exeter V40	Weber	53	343	0	0.00	0.00	1.08

Those marked with an * in the above table have revision rates significantly higher than the overall rate of 0.69 /100 ocys @ the 95% confidence interval. There are several other combinations with high revision rates but without statistical significance because of the wide CIs.
Those marked with a **#** as well as an * indicate those combinations used during 2011.
Revision rates for individual components have not been analysed for this report (see editorial) but it is pertinent to note that all 9 combinations with the Continuum cup (which was second most popular cup in 2011) had high revision rates although not all were statistically significant partly as a consequence of relatively few implanted and short follow-up periods leading to wide C.I.s.

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

Minimum of 100 primary registered arthroplasties

Fully Cemented

Combination	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
Exeter V40Contemporary	4778	22264	100	0.45	0.37	0.55
Spectron Reflection cemented	2925	21058	171	0.81	0.69	0.94
Exeter Contemporary	1551	14099	116	0.82	0.68	0.99
Exeter V40Exeter	1515	8628	38	0.44	0.31	0.60
Muller Muller PE cup	1353	95709	32	0.33	0.23	0.47
Exeter Exeter	1326	11525	82	0.71	0.57	0.88
CCACCB	649	3273	12	0.37	0.19	0.64
CPTZCA	525	3669	17	0.46	0.27	0.74
Exeter V40Reflection cemented	476	1636	5	0.31	0.10	0.71
Muller Muller PE cup	464	3544	17	0.48	0.28	0.77
MS 30Muller PE cup	462	3218	13	0.40	0.22	0.69
Charnley Charnley	456	3667	12	0.33	0.17	0.57
Versys cementedZCA	391	2720	16	0.59	0.34	0.96
Charnley Charnley Cup Ogee	303	2616	12	0.46	0.24	0.80
Elite plus Charnley	298	2727	16	0.59	0.34	0.95
Muller Weber	285	1716	3	0.17	0.04	0.51
Elite plus Elite Plus LPW	282	2130	8	0.38	0.16	0.74
Exeter V40CCB	266	644	2	0.31	0.04	1.12
TwinSys cementedCCB	254	568	2	0.35	0.04	1.27
C-Stem AMTMarathon cemented	179	259	2	0.77	0.09	2.78
Exeter V40Exeter X3	176	102	0	0.00	0.00	3.61
MullerZCA	132	301	1	0.33	0.01	1.85
MS 30Contemporary	128	784	5	0.64	0.21	1.49
Exeter Muller PE cup	119	1096	2	0.18	0.02	0.66
Exeter Bio-clad poly	113	1000	6	0.60	0.22	1.31
Elite plus Elite Plus Ogee	110	820	3	0.37	0.08	1.07

Uncemented

Combination	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
Corail Pinnacle	3200	7887	63	0.80	0.61	1.02
TwinSys uncementedRM Pressfit cup	2554	6602	49	0.74	0.55	0.98
CLSFitmore	1814	10376	45	0.43	0.32	0.58
Accolade Trident	1804	9242	64	0.69	0.53	0.88
CLSMorscher	1682	12884	67	0.52	0.40	0.66
CLSCLS Expansion	1259	9050	68	0.75	0.58	0.95
TwinSys uncemented Selexys TPS	1109	2819	34	1.21	0.84	1.69
Synergy Porous Reflection porous	1058	4420	27	0.61	0.40	0.89
Summit Pinnacle	944	3193	31	0.97	0.66	1.38
CLSDuraloc	699	5626	48	0.85	0.63	1.13
Corail Duraloc	464	2634	18	0.68	0.41	1.08
ABGIITrident	342	2000	19	0.95	0.57	1.48
CLSTrilogy	342	1152	8	0.69	0.30	1.37
Synergy PorousR3 porous	342	458	6	1.31	0.48	2.85
CLSRM Pressfit cup	311	961	5	0.52	0.17	1.21
S-RomPinnacle	289	1560	13	0.83	0.44	1.42
VersysTrilogy	273	2427	13	0.54	0.29	0.92
TwinSys uncementedDelta-PF Cup	270	559	1	0.18	0.00	1.00
CLSReflection porous	264	1042	10	0.96	0.46	1.77
TwinSys uncementedTrilogy	209	498	6	1.20	0.44	2.62
CLSDurom	198	895	13	1.45	0.77	2.48
CLSAllofit	192	804	8	1.00	0.43	1.96
CBC StemRM Pressfit cup	184	653	9	1.38	0.63	2.62
CBC StemExpansys shell	183	854	13	1.52	0.81	2.60
Accolade Pinnacle	180	455	2	0.44	0.05	1.59
Femoral Stem Press FitContinuum TM	165	198	4	2.02	0.55	5.18
CLSTrident	157	994	9	0.91	0.41	1.72
CorailASR	156	639	25	3.91	2.53	5.78
CorailReflection porous	140	502	1	0.20	0.01	1.11
ABGIIDuraloc	139	1223	16	1.31	0.75	2.12
S-RomASR	130	497	50	10.06	7.47	13.27
CLSContinuum TM	129	121	2	1.65	0.20	5.98
Polarstem uncementedReflection porous	129	134	5	3.73	1.21	8.70
Femoral Stem Press FitTrilogy	128	342	2	0.58	0.07	2.11
FTCDeltaMotion Cup	126	235	1	0.42	0.01	2.37
OmnifitTrident	126	814	9	1.11	0.51	2.10
TwinSys uncementedRM cup	121	259	2	0.77	0.09	2.79
ABGDuraloc	116	1319	13	0.99	0.52	1.69
Summit Trilogy	115	404	4	0.99	0.27	2.54
CLSRM cup	113	582	9	1.55	0.71	2.94
ProdigyDuraloc	113	1052	10	0.95	0.46	1.75
Synergy PorousBHR Acetabular Cup	112	418	6	1.44	0.53	3.13
ABGIIDelta-PF Cup	107	650	6	0.92	0.34	2.01
CLSWeill ring	106	992	6	0.60	0.22	1.32
Avenir Muller uncementedRM cup	105	157	1	0.64	0.02	3.55
Mallory-HeadM2A	105	642	6	0.93	0.34	2.03
Trabecular Metal StemContinuum TM	103	119	3	2.53	0.52	7.39
SummitDuraloc	101	613	4	0.65	0.18	1.67

Hybrid

Combination	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
Exeter V40Trident	4651	19116	98	0.51	0.42	0.62
SpectronReflection porous	2722	13970	96	0.69	0.56	0.84
Exeter V40Trilogy	1632	6705	34	0.51	0.35	0.71
Spectron Duraloc	1154	9465	98	1.04	0.84	1.26
MS 30Fitmore	1022	4659	13	0.28	0.15	0.48
Exeter V40Duraloc	987	5892	45	0.76	0.56	1.02
Exeter V40Pinnacle	904	1903	8	0.42	0.18	0.83
MullerRM cup	858	5659	40	0.71	0.50	0.96
ExeterOsteolock	836	7862	45	0.57	0.42	0.77
MS 30Morscher	787	6092	43	0.71	0.51	0.95
Exeter V40RM Pressfit cup	710	1968	7	0.36	0.14	0.73
Exeter V40Morscher	630	3842	21	0.55	0.34	0.84
CPTTrilogy	621	2572	27	1.05	0.69	1.53
Elite plusDuraloc	608	4397	58	1.32	1.00	1.71
ExeterDuraloc	553	5487	47	0.86	0.63	1.14
ExeterMorscher	551	5549	25	0.45	0.29	0.67
TwinSys cementedRM Pressfit cup	545	1387	4	0.29	0.08	0.74
Exeter V40Continuum TM	403	369	6	1.63	0.60	3.54
Exeter V40Tritanium	397	389	5	1.29	0.42	3.00
C-Stem AMTPinnacle	359	631	3	0.48	0.10	1.39
Exeter V40Reflection porous	355	1348	7	0.52	0.21	1.07
Exeter V40Osteolock	270	2006	9	0.45	0.21	0.85
Exeter V40Fitmore	263	831	2	0.24	0.03	0.87
Versys cementedTrilogy	235	1722	6	0.35	0.13	0.76
ExeterTrilogy	213	2006	12	0.60	0.31	1.05
CPTDuraloc	212	1667	8	0.48	0.21	0.95
Spectron Morscher	210	1872	13	0.69	0.37	1.19
MullerRM Pressfit cup	201	790	1	0.13	0.00	0.70
MUllerRM cup	168	1364	11	0.81	0.40	1.44
FriendlyDelta-PF Cup	159	613	2	0.33	0.04	1.18
SpectronMallory-Head	152	1021	6	0.59	0.22	1.28
MS 30Trilogy	149	533	3	0.56	0.12	1.64
TwinSys cementedRM cup	148	626	4	0.64	0.17	1.64
CPTTrident	145	762	7	0.92	0.37	1.89
SpectronR3 porous	144	152	3	1.97	0.41	5.77
CorailUltima	134	784	3	0.38	0.08	1.12
CCARM Pressfit cup	131	638	3	0.47	0.10	1.37
ExeterCLS Expansion	129	1202	7	0.58	0.23	1.20
CPTContinuum TM	127	90	2	2.21	0.27	7.99
Exeter V40Monoblock Acetabular Cup	123	908	5	0.55	0.18	1.29
AccoladeMuller PE cup	114	707	1	0.14	0.00	0.79
MullerTrilogy	111	319	3	0.94	0.19	2.75
Basis Reflection porous	101	222	1	0.45	0.01	2.50

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

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

Uncemented Cups no Liner

Size	Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
<=28	CC	0					
<=28	CP	3085	18711	122	0.65	0.54	0.78
<=28	MM	1295	9661	60	0.62	0.47	0.80
<=28	MP	4282	23835	140	0.59	0.49	0.69
>28	CC	251	302	1	0.33	0.00	1.85
>28	CP	659	914	3	0.33	0.07	0.96
>28	MM	1564	6638	155	2.34	1.98	2.73
>28	MP	1577	4264	27	0.63	0.42	0.92

The MM articulation >28mm head size had a significantly higher revision rate when compared to all other articulations.

Uncemented Cups With Liner

Size	Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
<=28	CC	640	3531	36	1.02	0.71	1.41
<=28	CM	16	35	0	0.00	0.00	10.50
<=28	CP	5000	30177	227	0.75	0.66	0.86
<=28	MM	1483	12897	76	0.59	0.46	0.74
<=28	MP	16747	99187	746	0.75	0.70	0.81
>28	CC	6015	19791	139	0.70	0.59	0.83
>28	CM	436	804	6	0.75	0.27	1.62
>28	CP	3058	7785	54	0.69	0.52	0.91
>28	MM	1543	6212	54	0.87	0.65	1.13
>28	MP	6656	15128	126	0.83	0.69	0.99

For head size <= 28mm the CC articulation had a significantly higher revision rate when compared to CP and MP; MP had a significantly higher revision rate when compared to MM despite overlap in the CIs.
For head size >28mm the MM articulation had a significantly higher revision rate when compared to CP.

Cemented Cups

Size	Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
<=28	CP	443	2839	20	0.70	0.43	1.09
<=28	MP	17721	116147	685	0.59	0.55	0.64
>28	CP	102	352	3	0.85	0.18	2.49
>28	MM	9	35	0	0.00	0.00	10.54
>28	MP	1984	5197	23	0.44	0.28	0.66

No statistical significance among the groups.

Summation for Revision vs Bearing Surfaces

Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
CC	6906	23624	176	0.75	0.64	0.86
CM	452	840	6	0.71	0.26	1.56
CP	12347	60778	429	0.71	0.64	0.78
MM	5894	35442	345	0.97	0.87	1.08
MP	48967	263758	1747	0.66	0.63	0.69

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

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

Head Size	Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-Component years	Exact 95% confidence interval	
28	CC	640	3530	36	1.02	0.71	1.41
	CM	16	35	0	0.00	0.00	10.50
	CP	8439	50776	360	0.71	0.64	0.79
	MM	2777	22551	136	0.60	0.51	0.71
	MP	36127	216610	1409	0.65	0.62	0.69
	Total	47999	293504	1941	0.66	0.63	0.69
32	CC	2406	9779	62	0.63	0.49	0.81
	CP	2730	7006	45	0.64	0.47	0.86
	MM	479	1851	14	0.76	0.41	1.27
	MP	9314	22943	158	0.69	0.59	0.80
	Total	14929	41580	279	0.67	0.59	0.75
36	CC	3411	9776	74	0.76	0.59	0.95
	CM	429	790	6	0.76	0.28	1.65
	CP	1089	2043	15	0.73	0.41	1.21
	MM	1000	4448	39	0.88	0.62	1.20
	MP	877	1511	18	1.19	0.71	1.88
	Total	6806	18570	152	0.82	0.69	0.96
>36	CC	449	537	4	0.75	0.20	1.91
	CM	7	13	0	0.00	0.00	27.24
	MM	1637	6585	156	2.37	2.01	2.77
	MP	16	57	0	0.00	0.00	6.46
	Total	2109	7192	160	2.22	1.89	2.60

Summary Revision Rates vs Head Size

Head Size	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
28	47999	293504	1941	0.66	0.63	0.69
32	14929	41580	279	0.67	0.59	0.75
36	6806	18570	152	0.82	0.69	0.96
>36	2109	7192	160	2.22	1.89	2.60

Head size > 36 mm (78% are Metal on Metal articulation) has a significantly higher revision rate compared to other 3 sizes and the 36 head size has a significantly higher revision rate than 28mm head size.

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	11575	65333	624	0.96	0.88	1.03
55_64	19312	104921	825	0.79	0.73	0.84
65_74	25508	135194	880	0.65	0.61	0.70
GE75	20651	96861	461	0.48	0.43	0.52

The < 55 age band has significantly higher revision rate than the other 3.

Revision vs Gender

Gender	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Female	40969	213487	1351	0.63	0.60	0.67
Male	36077	188822	1439	0.76	0.72	0.80

Males have a significantly higher revision rate than females.

Revision vs Surgeon Annual Workload

Operations per Year	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT10	950	5686	56	0.98	0.74	1.28
10_25	7748	40324	330	0.82	0.73	0.91
26_50	35971	185111	1331	0.72	0.68	0.76
51_75	18872	97551	590	0.60	0.56	0.66
76_100	5622	28864	161	0.56	0.47	0.65
GE100	7883	44774	322	0.72	0.64	0.80

Those surgeons performing <10 arthroplasties a year have a significantly higher revision rate than those performing 26 or more per year.

Revision vs Approach

Approach	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Anterior	3270	20535	138	0.67	0.56	0.79
Posterior	48206	245220	1780	0.73	0.69	0.76
Lateral	21362	111224	677	0.61	0.56	0.66
Troch	95	495	9	1.82	0.83	3.45

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

Revision for Dislocation vs Approach

Approach	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Anterior	3270	20535	30	0.15	0.10	0.21
Posterior	48206	245220	614	0.25	0.23	0.27
Lateral	21362	111224	124	0.11	0.09	0.13
Trochanteric	95	495	1	0.20	0.01	1.13
Total	72933	377474	769	0.20	0.19	0.22

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

Revision vs Arthroplasty Fixation

Fixation	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	21301	134322	765	0.57	0.53	0.61
Uncemented	27661	121372	1043	0.86	0.81	0.91
Hybrid	28084	146615	982	0.67	0.63	0.71

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

Revision by Arthroplasty Fixation vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55						
Cemented	598	4591	73	1.59	1.25	2.00
Uncemented	8324	42667	365	0.86	0.77	0.95
Hybrid	2653	18075	186	1.03	0.89	1.19
55-64						
Cemented	2172	16388	155	0.95	0.80	1.11
Uncemented	10266	47069	397	0.84	0.76	0.93
Hybrid	6874	41464	273	0.66	0.58	0.74
65-74						
Cemented	7682	53287	315	0.59	0.53	0.66
Uncemented	6684	24592	216	0.88	0.77	1.00
Hybrid	11142	57315	349	0.61	0.55	0.68
GE74						
Cemented	10849	60057	222	0.37	0.32	0.42
Uncemented	2387	7044	65	0.92	0.71	1.18
Hybrid	7415	29761	174	0.58	0.50	0.68

For age band <55 age band uncemented and hybrid hips have a significantly lower revision rate than cemented hips, but there is no significant difference between the first two.
For the 55-64 age band hybrid hips have a significantly lower revision rate than cemented and uncemented hips.
For the 65-74 and >74 age bands both cemented and hybrid hips have significantly lower revision rates than uncemented hips.
In addition, for the >74 age band, cemented hips have a significantly lower revision rate than hybrid hips.

Revision vs ASA Status

ASA Class	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1	7555	23357	200	0.86	0.74	0.98
2	25000	75654	558	0.74	0.68	0.80
3	9419	26866	218	0.81	0.71	0.93
4	312	747	7	0.94	0.38	1.93

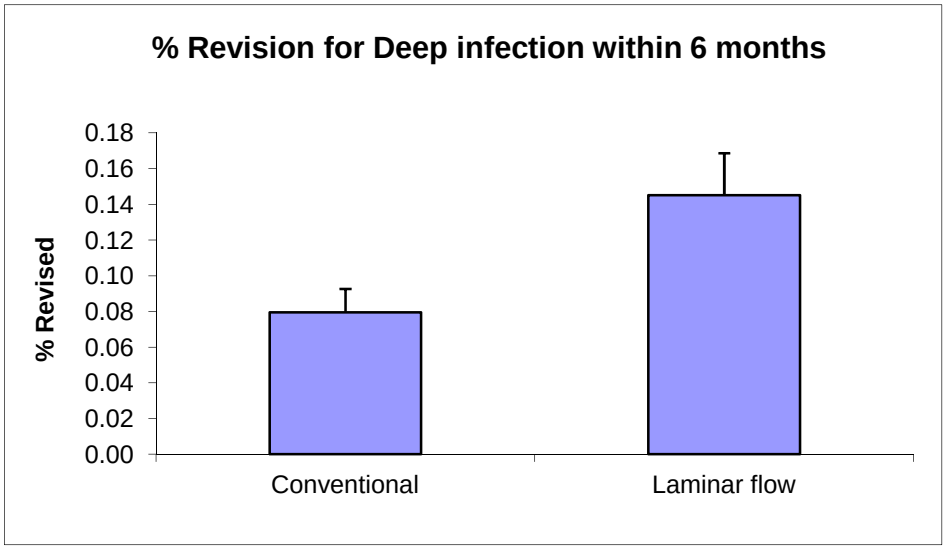
Revision vs ASA Public Private Hospitals

Public/Private	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Public	21656	63920	469	0.73	0.67	0.80
Private	20630	62704	514	0.82	0.75	0.89

There are no significant differences among ASA groups or between public & private hospitals

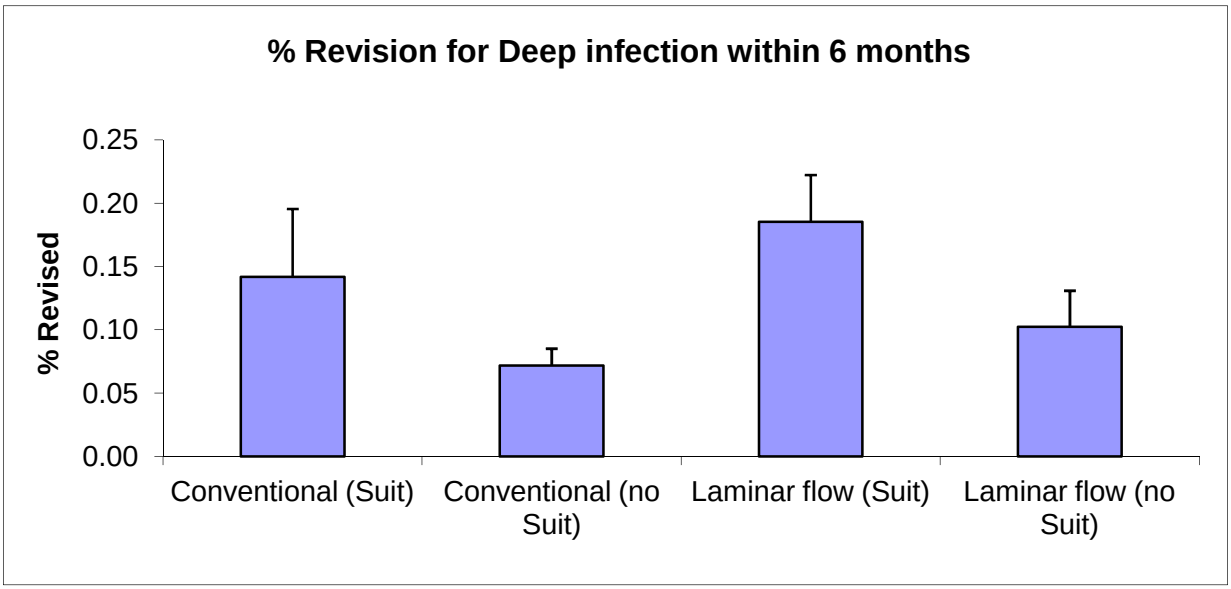
Revision for Deep Infection within 6 months vs Theatre Environment

Theatre	Total Number	Number revised	%	Std Error
Conventional	45318	36	0.08	0.01
Laminar flow	26171	38	0.15	0.02



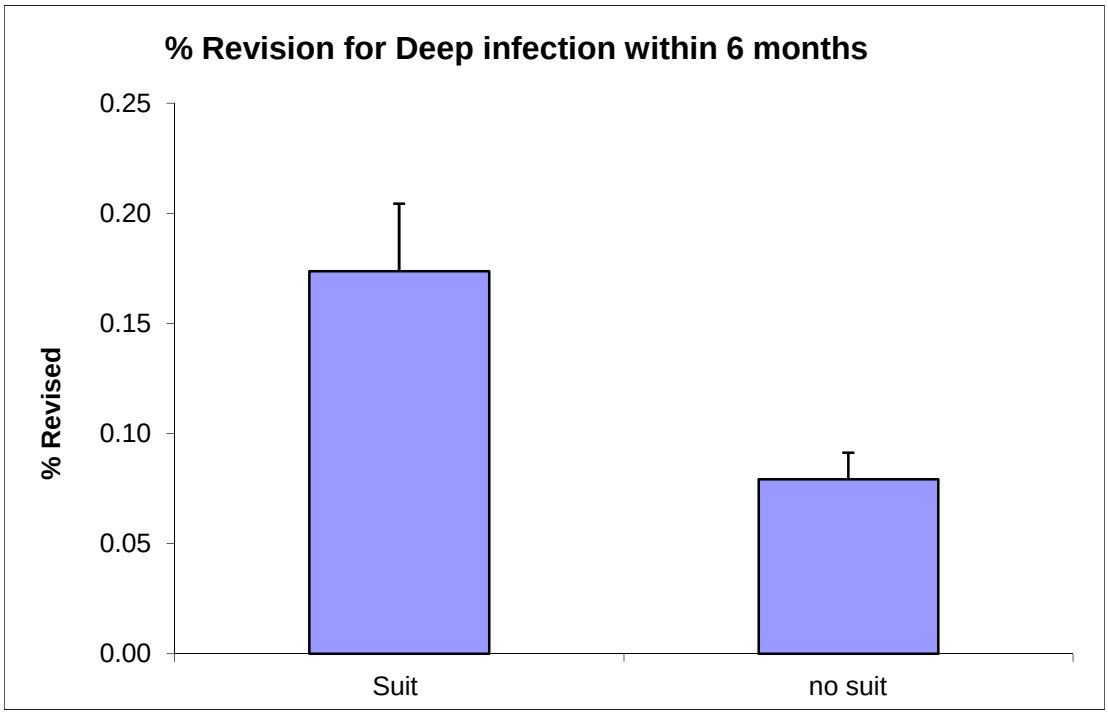
There is a significant difference in revision rates(2x)for deep infection within 6 months of surgery between conventional and laminar flow theatres.

		Total Number	Number revised	%	Std Error
Conventional	Suit	4933	7	0.14	0.05
	no suit	40385	29	0.07	0.01
Laminar flow	Suit	13488	25	0.19	0.04
	no suit	12683	13	0.10	0.03



There is a significant difference in the revision rates between conventional/ no suit and laminar flow/suit environments. There is 2.7 times the risk for revision in the latter compared to the former environment..

	Total Number	Number revised	%	Std Error
Suit	18421	32	0.17	0.03
no suit	53068	42	0.08	0.01

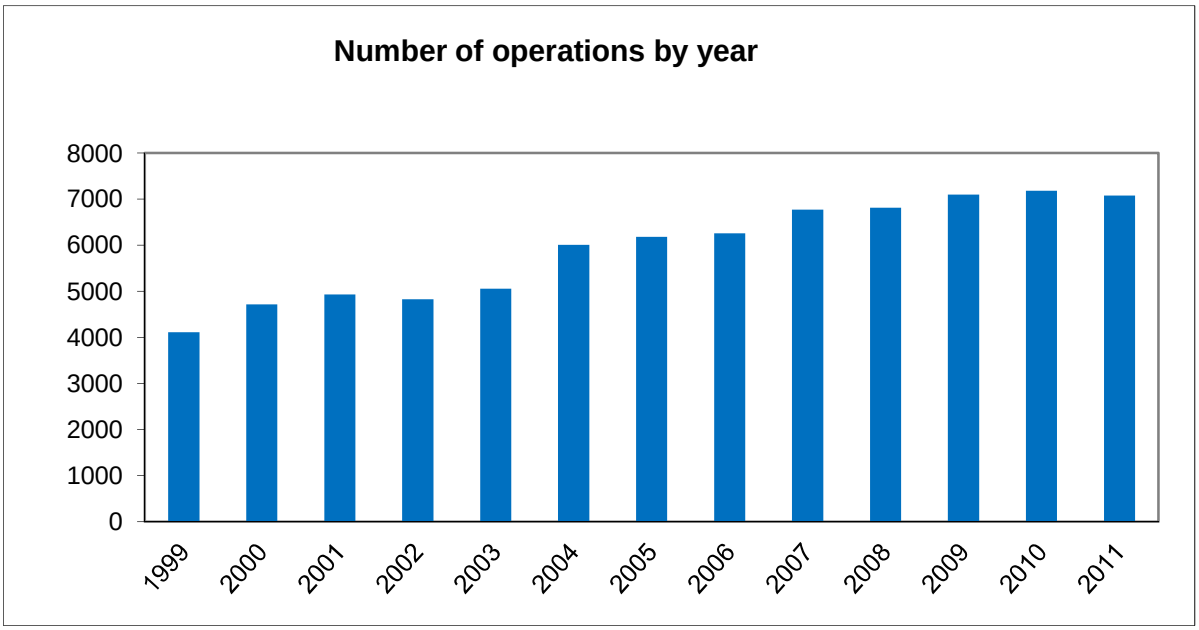


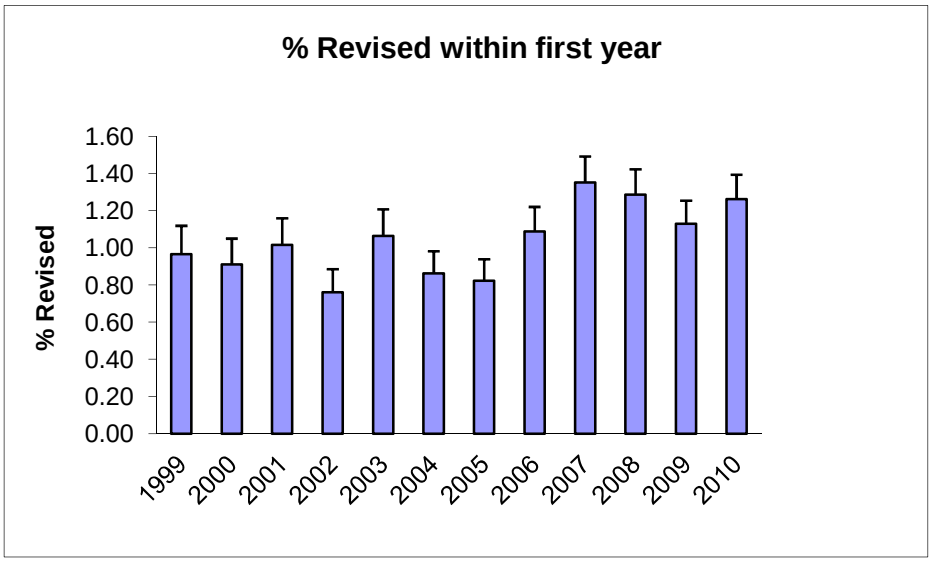
Furthermore there is a significant increase in revision rates (2.1 x) when suits are used in either conventional or laminar flow theatres.

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

Percentage of hips revised in the first year

The following two bar graphs show that the percentage of hips revised in the first year after arthroplasty slightly rose in 2010 halting the downward trend of the previous 2 years.





Resurfacing Arthroplasty

All Patients

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1237	4206.3	41	0.97	0.70	1.32

Although there is a higher revision rate compared to conventional hip arthroplasty it is not statistically significant.

Resurfacing Prosthesis vs Revision Rate

Prosthesis	No. Ops.	Sum comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Adept	4	15	0	0	0	24.42
ASR	132	673	13	1.93	1.03	3.30
BHR	1059	3418	25	0.73	0.47	1.08
BMHR	23	35	0	0	0	10.47
Conserve Superfinish	3	8	0	0	0	48.59
Durom	4	30	0	0	0	12.19
Mitch TRH Resurfacing Head	12	27	3	11.28	2.33	32.97

The Mitch TRH has a very significantly higher revision rate but none were implanted in 2011.

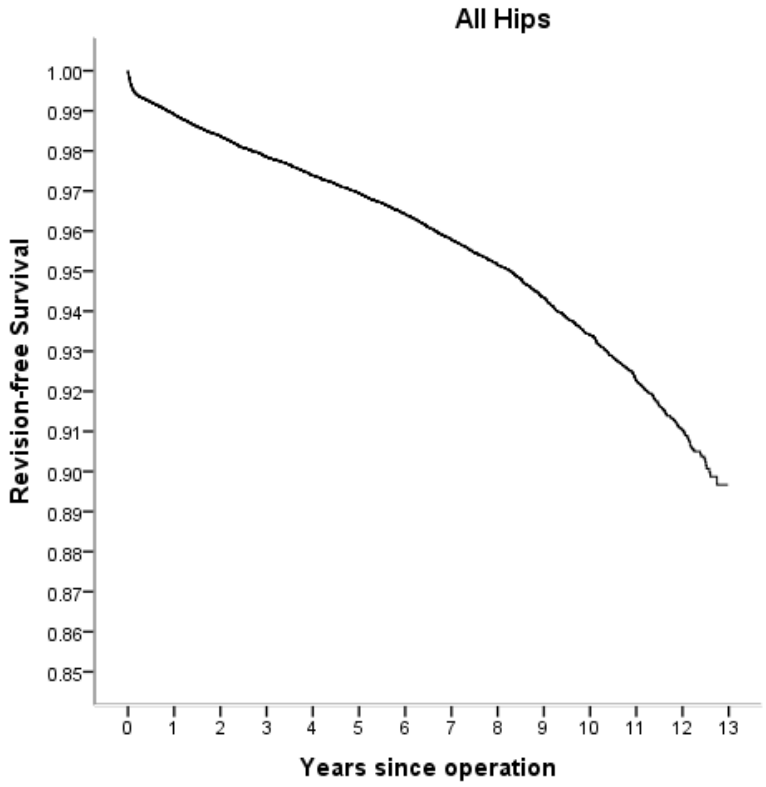
Head size vs Revision Rate

Hips resurfacing head size	No. Ops	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
<=44	96	320	8	2.50	1.08	4.92
45-49	280	1039	15	1.44	0.81	2.38
50-54	782	2507	16	0.64	0.36	1.04
>=55	79	339	2	0.59	0.07	2.13

The <=44 mm head has a significantly higher revision rate than the 50-54mm head size.

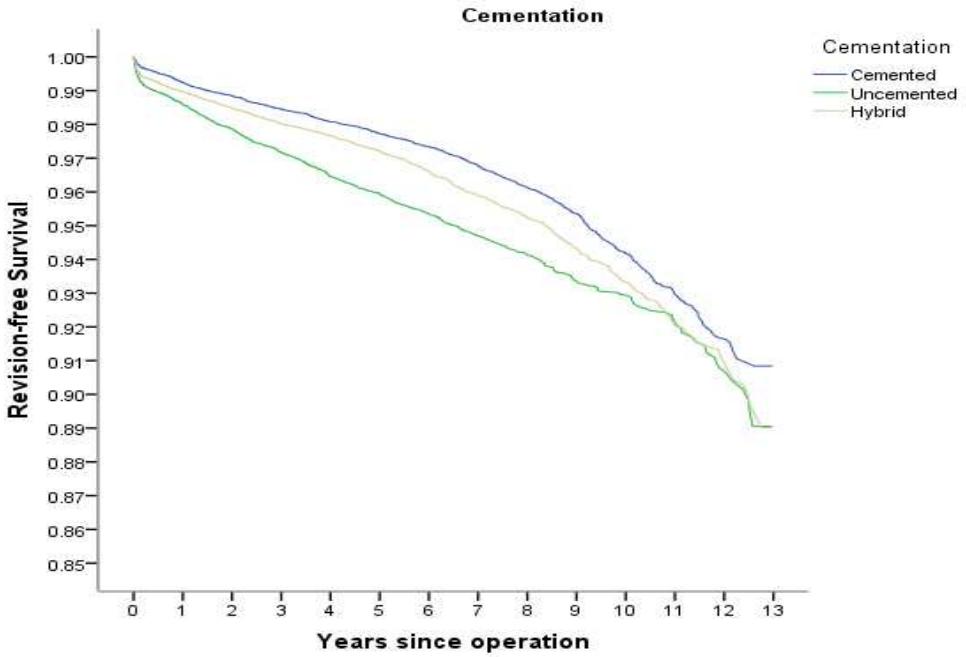
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the years 1999 – 2011 with deceased patients censored at time of death.



Years	% Revision-free	No in Each year
1	98.88	68006
2	98.34	59697
3	97.83	51623
4	97.37	44114
5	96.93	36851
6	96.40	30326
7	95.76	24158
8	95.14	18421
9	94.35	13722
10	93.40	9550
11	92.30	5831
12	91.07	2539

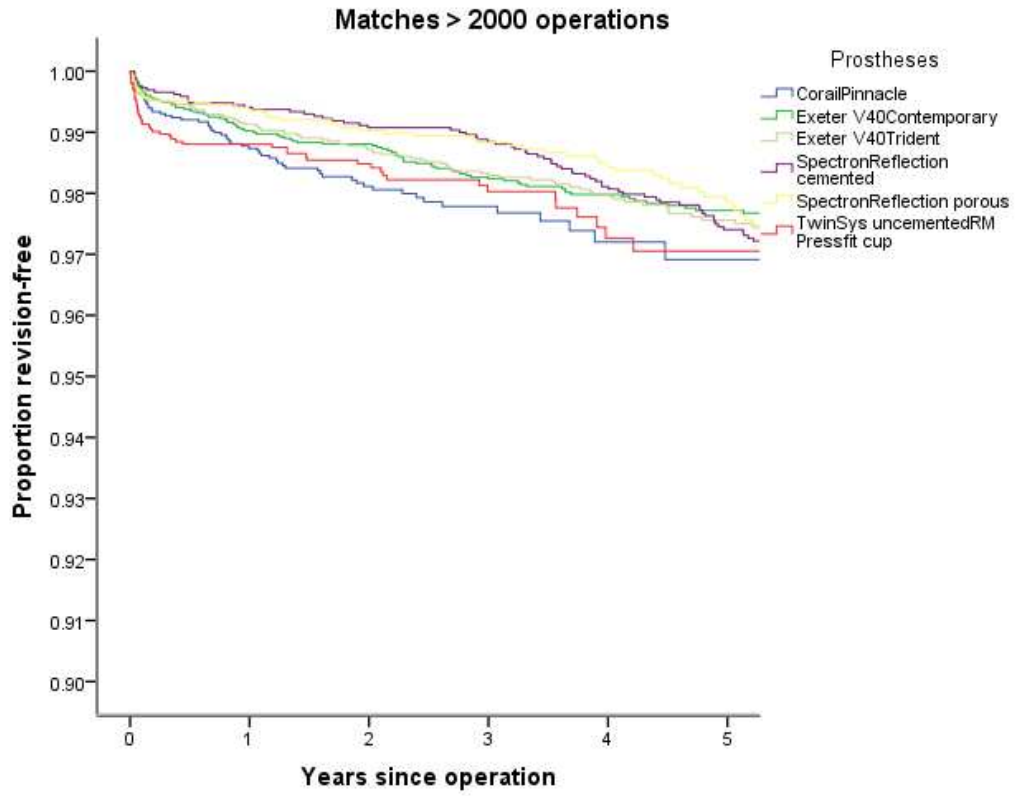
The KM analysis is to12yrs rather than 13 as too few registered hips were revised in 2011.

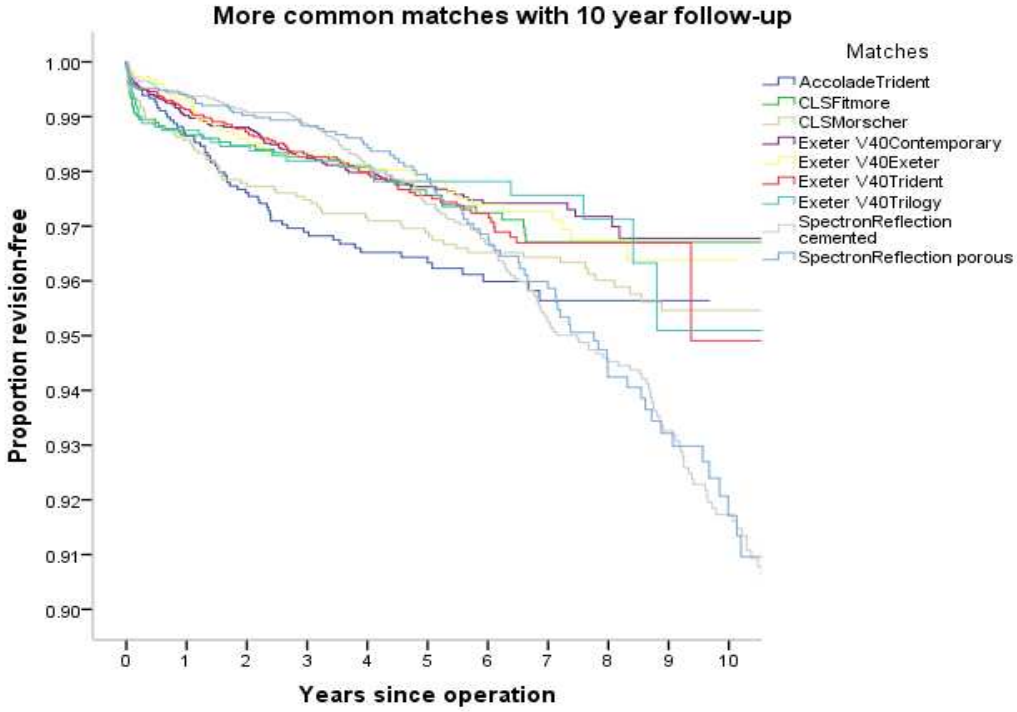


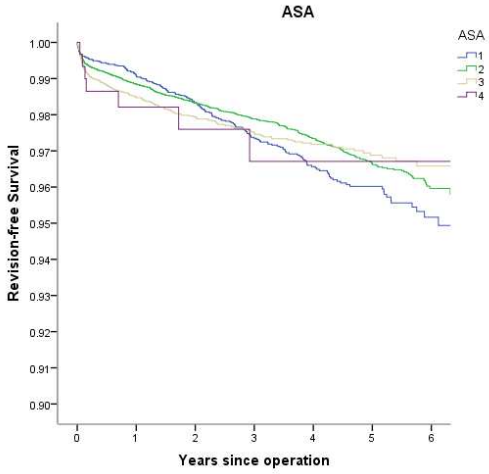
Cemented	
Years	% Revision-free
1	99.24
2	98.83
3	98.45
4	98.08
5	97.73
6	97.34
7	96.77
8	96.13
9	95.38
10	94.17
11	92.98
12	91.66

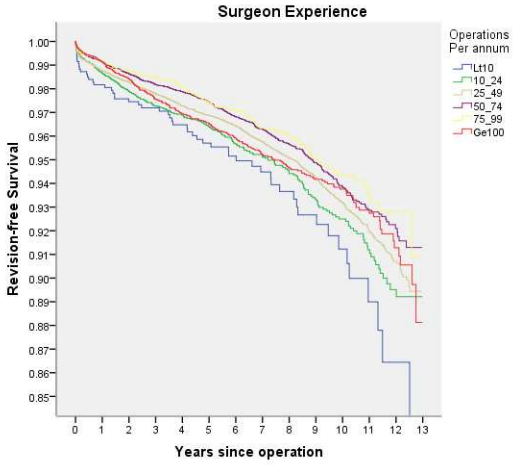
Uncemented	
Years	% Revision-free
1	98.55
2	97.83
3	97.12
4	96.43
5	95.91
6	95.30
7	94.67
8	94.10
9	93.36
10	92.94
11	92.18
12	90.76

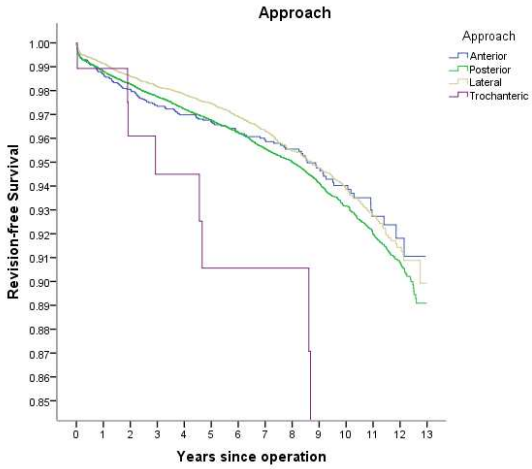
Hybrid Years	% Revision-free
1	98.94
2	98.46
3	98.00
4	97.65
5	97.19
6	96.59
7	95.87
8	95.22
9	94.35
10	93.35
11	92.14
12	91.16

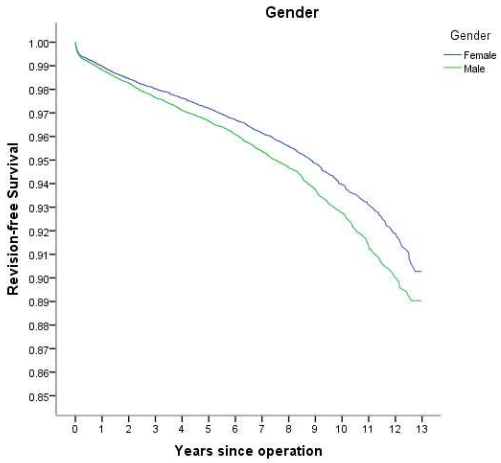

Matches > 2000 operations
Prostheses
CorailPinnacle
Exeter V40Contemporary
Exeter V40Trident
SpectronReflection cemented
SpectronReflection porous
TwinSys uncementedRM Pressfit cup
Proportion revision-free
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0
1
2
3
4
5
Years since operation

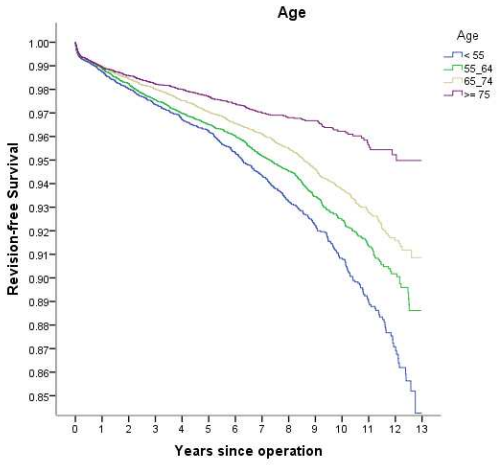

More common matches with 10 year follow-up
Matches
AccoladeTrident
CLSFitmore
CLSMorscher
Exeter V40Contemporary
Exeter V40Exeter
Exeter V40Trident
Exeter V40Trilogy
SpectronReflection cemented
SpectronReflection porous
Proportion revision-free
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0
1
2
3
4
5
6
7
8
9
10
Years since operation


ASA
ASA
1
2
3
4
Revision-free Survival
Years since operation


Surgeon Experience
Operations Per annum
Lt10
10_24
25_49
50_74
75_99
Ge100
Revision-free Survival
Years since operation


Approach
Approach
Anterior
Posterior
Lateral
Trochanteric
Revision-free Survival
Years since operation


Gender
Gender
Female
Male
Revision-free Survival
Years since operation


Age
Age
< 55
55_64
65_74
>= 75
Revision-free Survival
Years since operation

Re-revisions of conventional hips
Analysis was undertaken of 3 groups of hip re-revisions.

There were 322 registered conventional hip replacements that had been revised twice, 65 that had been revised three times, 17 that had been revised four times and 1 revised 5 times.

Second revision
Time between the first and second revisions averaged 602 days, with a range of 1 – 3669 and a standard deviation of 721. This compares to an average of 1366 days between the primary and first revision.

Reason for revision

Dislocation	104
Deep infection	91
Loosening femoral component	42
Loosening Acetabulum component	40
Pain	36
Fracture femur	23
Other	31

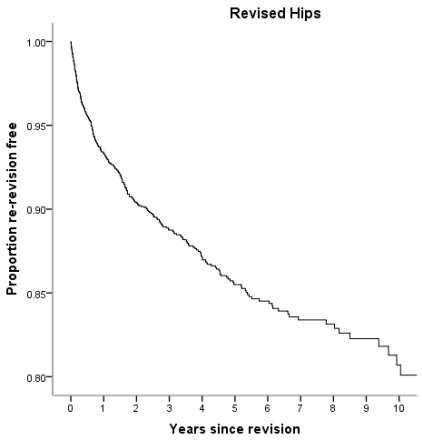
Revision

Change of head	190
Change of acetabulum	111
Change of liner	129
Change of all	90
Change of femoral	87

Second Revision

Number of primary revisions	Observed comp. yrs	Number of First Re-Revisions	Rate/100-component-years	Exact 95% confidence interval	
2790	9111.0	322	3.53	3.16	3.94

The re- revision rate is highly significant when compared to the primary revision rate of 0.69/100 component years



Years	% re-revision free
1	92.73
2	90.13
3	88.53
4	86.70
5	85.27
6	84.09
7	83.39
8	82.61
9	82.28
10	80.14

Third revision
The average time between second and third revisions for the 65 arthroplasties was 465 days with a range of 1 – 3065 and a standard deviation of 562.

Fourth revision
The average time between the third and fourth revisions for the 17 arthroplasties was 202 days with a range of 18 – 679 and a standard deviation of 207.

Fifth revision
There was 1 registered with time to revision 399 days.

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

Re- revisions of resurfacing hip replacements
There have been 12 re-revisions.
The time between the first and second revisions averaged 398 days, with a range of 21 – 1193 and a standard deviation of 376.

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

Questionnaires at six months post surgery

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

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

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

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

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

For the thirteen year period, and as at July 2012, there were 24,113 primary hip questionnaire responses registered six months post surgery.
The mean hip score was 40.61 (standard deviation 7.45, range 48 – 2).

Scoring	**> 41**	**13881**
Scoring	34 -41	6486
Scoring	27 -33	2292
Scoring	< 27	1454

At six months post surgery, 85% had an excellent or good score.

Questionnaires at five years post surgery

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

This dataset represents sequential Oxford hip scores for 5,994 individual patients.

At five years post surgery, 89% of these patients achieved an excellent or good score and had a mean of 42.50.

Questionnaires at ten years post surgery

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

This dataset represents sequential Oxford hip scores for 4,202 individual patients.

At ten years post surgery, 87% of these patients achieved an excellent or good score and had a mean of 41.79.

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

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

Percentage scoring 0 or 1 (worst categories) for each question at six-months (24113), at five years (5,994) and at ten years post surgery (4202).

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

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

Revision hip questionnaire responses

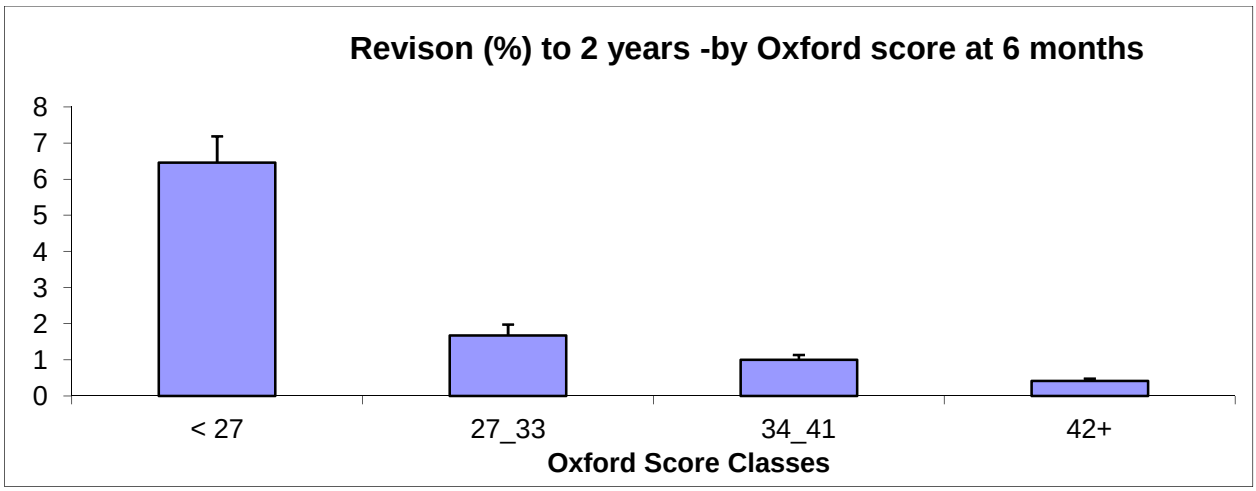
There were 5,945 revision hip responses with 65% achieving an excellent or good score. This group includes all revision hip procedures including revisions of primary arthroplasties performed prior to 1999. The mean revision hip score was 35.77 (standard deviation 9.52, range 48 – 3).

OXFORD 12 SCORE AS A PREDICTOR OF HIP ARTHROPLASTY REVISION

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

Six month score and revision arthroplasty

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

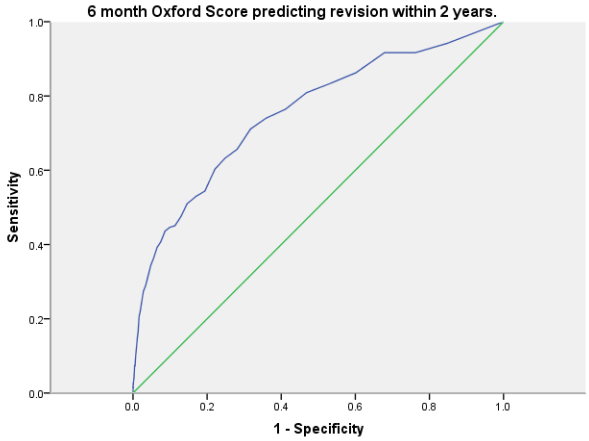


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date.

Kalairajah Group	No in Group	No. revised	%	Std error
< 27	1146	74	6.46	0.73
27-33	1792	30	1.67	0.30
34-41	5216	52	1.00	0.14
42+	11468	48	0.42	0.06

A person with a 6 month Oxford score >42 has a 0.42% risk of revision within two years compared to a 6.46% risk with a score of < 27.

A ROC analysis has demonstrated that a patient with a score less than or equal to 38.5 has 5 times the risk of needing a revision within 2 years compared to a person with a score greater than 38.5.
Alternatively the ROC analysis predicted 70% of the revisions within 2 years from just the lowest 30% of Oxford scores.

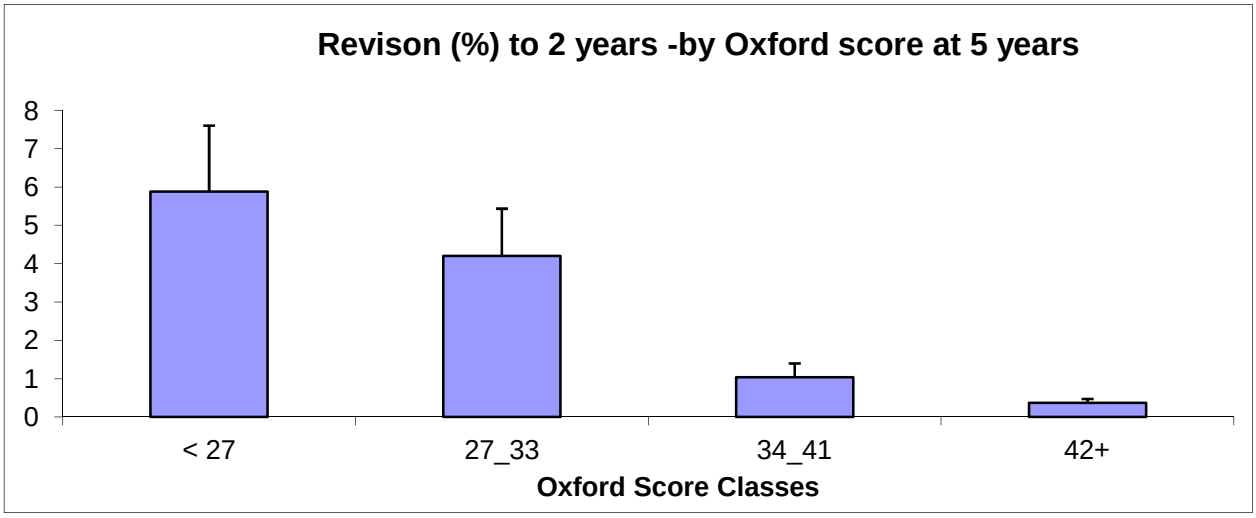


A receiver operating characteristic (ROC) curve is a graphical representation of the tradeoff between the false negative and false positive rates for every possible cutoff. Equivalently, the ROC curve is the representation of the tradeoffs between sensitivity and specificity. The more the

curve climbs towards the upper left corner the better the reliability of the test.

Five year score and revision arthroplasty

As with the six month scores, plotting the patients 5 year scores in the Kalairajah groupings against the proportion of hips revised for that same group demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 16 times the risk of a revision within 2 years compared to a person with a score >41.

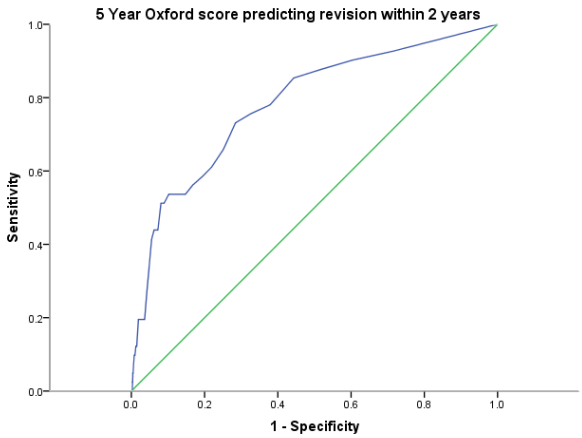


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 5 year score date

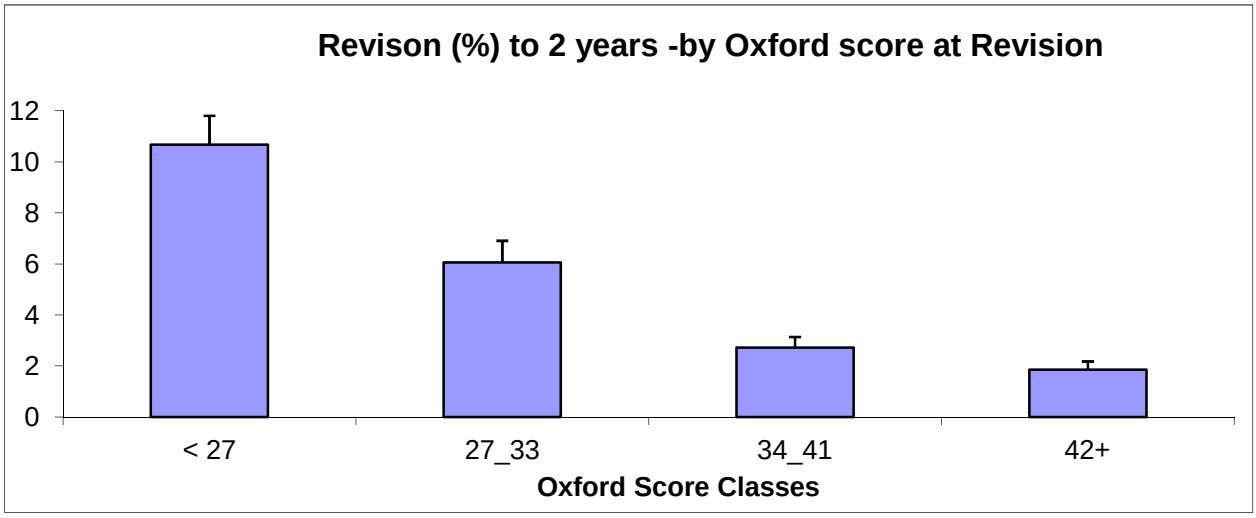
Kalairajah Group	No in Group	No. revised	%	Std error
< 27	187	11	5.88	1.72
27-33	262	11	4.20	1.24
34-41	771	8	1.04	0.36
42+	3001	11	0.37	0.11

A person with a 5 year Oxford score >42 has a 0.37 % risk of revision within two years compared to a 5.88% risk with a score 27.

The ROC analysis at 5 years has demonstrated that a patient with a score less than or equal to 41.5 has 7 times the risk of needing a revision within 2 years compared to a person with a score greater than 41.5.
Alternatively the ROC analysis predicted 74% of the revisions within 2 years from just the lowest 30% of Oxford scores.



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



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

Kalairajah Group	Revision to 2 yrs	No. revised	%	Std error
< 27	731	78	10.67	1.14
27-33	792	48	6.06	0.85
34-41	1506	41	2.72	0.42
42+	1675	31	1.85	0.33

A person with a 6 month Oxford score >42 has a 1.85% risk of revision within two years compared to a 10.67% risk with a score < 27.

KNEE ARTHROPLASTY

PRIMARY KNEE ARTHROPLASTY

The thirteen-year report analyses data for the period January 1999 – December 2011. There were 58,496 primary knee procedures registered, an additional 6,276 compared to last year's report.
This includes 207 patello-femoral prostheses with 51 registered in 2011.

1999	2429
2000	3015
2001	3059
2002	2896
2003	3046
2004	4103
2005	5024
2006	5156
2007	5764
2008	5600
2009	6019
2010	6109
2011	6276

There was a 2.7% increase in registrations for 2011 compared to 2010 but a 33% increase in patello-femoral registrations. These compare to a 2% decrease for primary hip registrations in 2011.

DATA ANALYSIS

Age and sex distribution
The average age for a knee replacement was 68.47 years, with a range of 8.19 – 100.49 years.

All knee arthroplasty

	Female	Male
Number	30223	28273
Percentage	51.67	48.33
Mean age	68.82	68.10
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.93	9.43

Conventional knee arthroplasty

	Female	Male
Number	30066	28223
Percentage	51.58	48.42
Mean age	68.85	68.11
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.91	9.42

Patello-femoral arthroplasty

	Female	Male
Number	157	50
Percentage	75.85	24.15
Mean age	61.93	60.56
Maximum age	87.75	83.63
Minimum age	31.15	34.38
Standard dev.	11.80	12.01

Body Mass Index
For the two-year period 2010 - 2011, there were 5424 BMI registrations for primary knee replacements. The average was 31.02 (obese) with a range of 15 – 58 and a standard deviation of 5.99.

Previous operation

None	48799
Menisectomy	6049
Osteotomy	1063
Arthroscopy/debridement	965
Ligament reconstruction	639
Internal fixation for juxtarticular fracture	457
Patellectomy	227
Synovectomy	116
Removal of loose body	39
Other	141

Diagnosis

Osteoarthritis	55031
Rheumatoid arthritis	1600
Post fracture	621
Other inflammatory	535
Post ligament disruption /reconstruction	358
Avascular necrosis	205
Tumour	65
Other	102

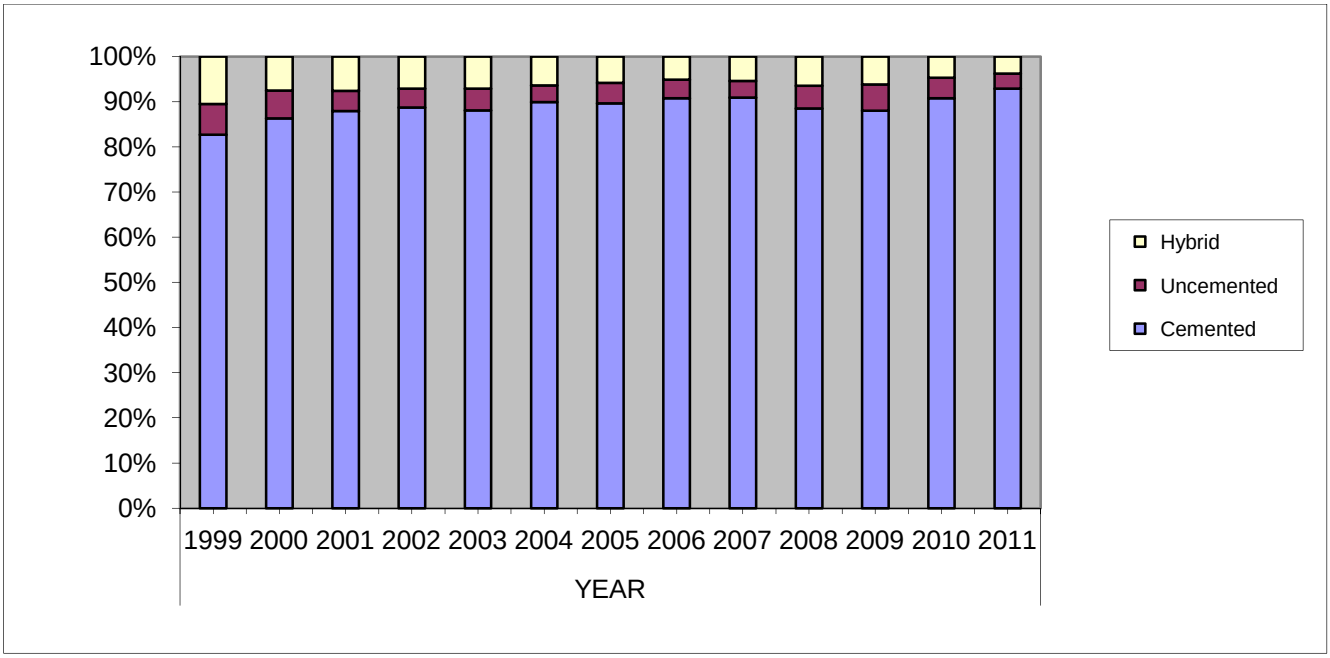
Approach

Medial parapatellar	53035
Other	1444
Lateral parapatellar	926
Image guided surgery	4549
Minimally invasive surgery	126

Image guided surgery was added to the updated forms at the beginning of 2005 and in 2011was used for 14% of primary knee arthroplasties, the same as for the last 3 years.`

Bone graft

Femoral autograft	115
Femoral allograft	10
Femoral synthetic	3
Tibial autograft	63
Tibial allograft	16



A hybrid knee has cemented tibia and uncemented femur.

Cement

Femur cemented	52654	90%
Antibiotic in cement	35691	68%
Tibia cemented	55267	95%
Antibiotic in cement	36979	67%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	55323	95%

A cephalosporin was used in 87% of arthroplasties.

Operating theatre

Conventional	33354
Laminar flow	24704
Space suits	18100

In 2011, 47% of knee arthroplasties were performed in laminar flow theatres, slightly down from 2010 (51%) and space suits were used in 40%, similar to 2010.

ASA Class

This was introduced with the updated forms at the beginning of 2005. For the seven-year period 2005 – 2011, there were 36722 (92%) 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	4254	12
2	23305	63
3	8990	24
4	173	1

Operative time (skin to skin)

Mean	84 minutes
Standard deviation	26 minutes
Minimum	24 minutes
Maximum	461 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the seven-year period 2005 – 2011.

Consultant	34804
Advanced trainee supervised	3233

Basic trainee	923
Advanced trainee unsupervised	873

Prosthesis usage

Patello-femoral prostheses registered

Avon-patello	**111**
Gender	57
Journey	30
LCS PFJ	6
Mod 3	1
RBK	1
Themis	1

There are 207 patello-femoral procedures registered to 55 surgeons. Avon- patello is the most common prosthesis at 54% of the total but the Gender prosthesis more than trebled its number in 2011.

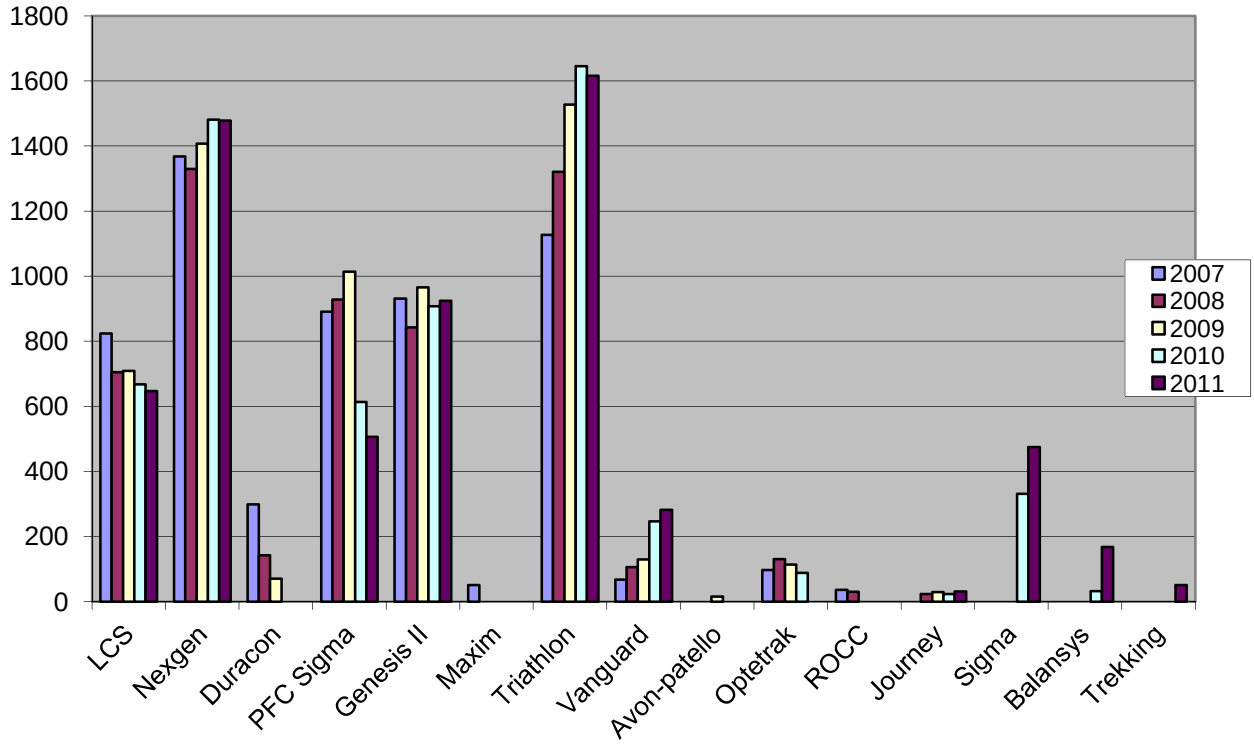
Conventional primary knees

Top 10 knee prostheses used in 2011

Triathlon	**1616**
Nexgen	1478
Genesis II	924
LCS	647
PFC Sigma	506
Sigma	475
Vanguard	282
Balansys	168
Trekking	51
Journey	31

The same order as for 2010 except that theTrekking prosthesis replaces the Optetrak.

Most Used Knee Prostheses for 5 years 2007 – 2011



Patellar resurfacing
40,521 (70%) of the conventional knee procedures were registered with the patella not resurfaced and 17,768 (30%) with the patella resurfaced.

Surgeon and hospital workload

Surgeons
In 2011, 196 surgeons performed 6,276 total knee replacements, an average of 32 procedures per surgeon. 30 surgeons performed less than 10 procedures and 50 performed more than 40.

Hospitals
In 2011 primary knee replacement was performed in 53 hospitals. 27 were public hospitals and 26 were private.

For 2011 the average number of total knee replacements per hospital was 118.

REVISION KNEE ARTHROPLASTY

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

Data analysis

For the thirteen-year period January 1999 – December 2011, there were 4,603 revision knee procedures registered. This is an additional 445 compared to last year's report.

The average age for a revision knee replacement was 69.79 years, with a range of 10.57 – 98.39 years.

Revision knees

	Female	Male
Number	2208	2395
Percentage	47.97	52.03
Mean age	70.19	69.42
Maximum age	95.80	98.39
Minimum age	10.57	15.49
Standard dev.	10.56	10.15

The percentage of revision knees to primary knees is 8% and a ratio of 1:13.7.

Body Mass Index

For the two-year period 2010 - 2011, there were 262 BMI registrations for revision knee replacements. The average BMI was 30.76 with a range of 15 – 50 and a standard deviation of 5.87.

REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTIES

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

There were 1451 revisions of the 58,289 primary conventional knee replacements (2.5%) and 12 revisions of the 207 patello-femoral prostheses (5.8%).

Conventional knee replacement analysis

Time to revision

Mean	1064 days
Maximum	4424 days
Minimum	1 day
Standard deviation	949 days

Reason for revision

Pain	449
Deep infection	353
Patellar resurfacing.	340
Loosening tibial component	339
Loosening femoral component	169
Instability	107
Stiffness	53
Dislocation component	34
Fracture tibia	27
Loosening patellar component	26
Wear component	28
Malalignment	23
Fracture femur	20
Implant breakage	11
Osteolysis	10
Other	48

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

Analysis by time of the 4 main reasons for revision

		Years since operation													
		0	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	Count	19	64	148	79	45	30	16	14	12	7	5	9	1	449
	%	4.20	14.30	33.00	17.60	10.00	6.70	3.60	3.10	2.70	1.60	1.10	2.00	0.20	
2	Count	80	59	82	40	37	13	11	13	8	4	2	4	0	353
	%	22.70	16.70	23.20	11.30	10.50	3.70	3.10	3.70	2.30	1.10	0.60	1.10	0.00	
3	Count	10	58	123	60	37	2	7	6	4	6	1	4	2	340
	%	2.90	17.10	36.20	17.60	10.90	6.50	2.10	1.80	1.20	1.80	0.30	1.20	0.60	
4	Count	10	21	47	58	49	41	27	29	22	7	15	6	7	339
	%	2.90	6.20	13.90	17.10	14.50	12.10	8.00	8.60	6.50	2.10	4.40	1.80	2.10	

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

Patello-Femoral Arthroplasty

Revision of patello-femoral knees
207 and 12 had been revised.

Mean time to revision	815 days
Maximum	1582 days
Minimum	126 days
Standard deviation	472 days

Reason for revision

Pain	5
Loosening patellar	2
Progression of disease	4
Synovitis	1

Patellar resurfacing
As noted previously, 70 %(40,521) of the 58,289 registered conventional primary knees did not have the patella resurfaced and 30% (17,768) were resurfaced. Of the group that was not resurfaced, 215 (0.4%) had the patella later resurfaced as the only revision procedure and a further 126 had the patella resurfaced as part of other component revision.

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

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

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

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

All Primary Total Knee Arthroplasties

No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
58289	284215	1451	0.51	0.48	0.54

Revision Rate of Individual Knee Prostheses Sorted by Revision Rate

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Insall/Burstein	249	2302.1	43	1.868	1.352	2.516
ROCC	66	261.4	3	1.147	0.237	3.353
Optetrak	614	2141.7	21	0.981	0.607	1.499
Journey	111	212.8	2	0.940	0.114	3.396
Scorpio	852	5629.3	42	0.746	0.538	1.009
Vanguard	838	1493.9	11	0.736	0.368	1.318
LCS	11763	73088.8	421	0.576	0.522	0.634
Nexgen	12927	59721.6	318	0.532	0.476	0.594
MBK	256	2347.3	12	0.511	0.264	0.893
Genesis II	7965	34982.6	173	0.495	0.424	0.574
Triathlon	8000	20397.8	87	0.427	0.342	0.526
PFC Sigma	8544	38415.9	164	0.427	0.364	0.497
Advance	157	1225.7	5	0.408	0.132	0.952
AGC	376	3236.5	12	0.371	0.192	0.648
Maxim	822	6141.4	22	0.358	0.224	0.542
Duracon	4206	30534.0	96	0.314	0.255	0.384
AMK	95	965.2	1	0.104	0.003	0.577
Balansys	205	147.9	0	0.000	0.000	2.495
Trekking	52	15.8	0	0.000	0.000	23.380

Hybrid Knee: tibia cemented, femur uncemented

The Insall/Burstein, Optetrak, Scorpio and LCS (despite overlap of CIs) prostheses have significantly higher revision rates than the overall rate of 0.51/100 ocys @ the 95% confidence interval. The Optetrak and LCS were the only ones implanted in 2011

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

Revision vs Arthroplasty Fixation

Fixation	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	52117	251428	1218	0.48	0.46	0.51
Uncemented	2667	13607	133	0.98	0.82	1.16
Hybrid	3505	19181	100	0.52	0.42	0.63

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

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

Minimum of 50 primary registered arthroplasties

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Insall/Burstein	249	2302	43	1.868	1.352	2.516
Optetrak	268	981	13	1.325	0.705	2.266
Journey	111	213	2	0.940	0.114	3.396
Scorpio	850	5609	42	0.749	0.540	1.012
Vanguard	826	1470	11	0.748	0.374	1.339
Nexgen	12287	56688	306	0.540	0.481	0.604
MBK	247	2268	12	0.529	0.273	0.924
Genesis II	7912	34587	170	0.492	0.420	0.571
LCS	8144	53200	246	0.462	0.406	0.524
Triathlon	7862	19999	85	0.425	0.339	0.526
PFC Sigma	8030	36772	156	0.424	0.360	0.496
Advance	157	1226	5	0.408	0.132	0.952
AGC	376	3236	12	0.371	0.192	0.648
Maxim	822	6141	22	0.358	0.224	0.542
Duracon	3425	24602	77	0.313	0.247	0.391
AMK	95	965	1	0.104	0.003	0.577
Balansys	205	148	0	0.000	0.000	2.495
Trekking	52	16	0	0.000	0.000	23.380

The Insall/Burstein, Optetrak and Scorpio prostheses have significantly higher revision rates than the overall rate of 0.51/100 ocys @ the 95% confidenc

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

Minimum of 50 primary registered arthroplasties

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Optetrak	346	1160	8	0.689	0.298	1.358
LCS	1680	10159	58	0.571	0.434	0.738
PFC Sigma	507	1624	8	0.493	0.213	0.971
Triathlon	136	393	2	0.508	0.062	1.836
Genesis II	51	394	2	0.508	0.062	1.836
Duracon	321	2776	13	0.468	0.249	0.801
Nexgen	426	2505	8	0.319	0.138	0.629

There are no significantly higher revision rates than the overall rate of 0.51/100 ocys @ the 95% confidence

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

Minimum of 50 primary registered arthroplasties

Prosthesis	No. of Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LCS	1939	9729	117	1.20	0.99	1.44
Nexgen	214	528	4	0.76	0.21	1.94
Duracon	460	3156	6	0.19	0.07	0.41

The LCS prosthesis has a significantly higher revision rate than the overall rate of 0.51/100 ocys @ the 95% confidence

Revision Rates for Fixed vs Mobile Bearing Knees

Prosthesis	Fixed Mobile	No. of Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Nexgen	Mobile	1992	7105	39	0.55	0.39	0.75
	Fixed	10692	51974	275	0.53	0.47	0.59
PFC Sigma	Mobile	3539	13304	58	0.44	0.33	0.56
	Fixed	4925	24869	102	0.41	0.33	0.50
Scorpio	Mobile	89	572	3	0.52	0.11	1.53
	Fixed	737	4913	36	0.73	0.51	1.01
Triathlon	Mobile	191	543	1	0.18	0.01	1.03
	Fixed	7717	19718	86	0.44	0.35	0.54
Duracon	Fixed	4126	29919	93	0.31	0.25	0.38
Genesis II	Fixed	7445	33015	157	0.48	0.40	0.56
Insall/Burstein	Fixed	249	2302	43	1.87	1.35	2.52
LCS	Mobile	11763	73089	421	0.58	0.52	0.63
Maxim	Fixed	821	6131	21	0.34	0.21	0.52
MBK	Mobile	247	2268	12	0.53	0.27	0.92

Overall Revision Rates for Fixed vs Mobile Bearing Knees

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Fixed	36721	172897	813	0.47	0.44	0.50
Mobile	17823	96892	534	0.55	0.51	0.60

There is a significantly higher revision rate for mobile bearing knees when compared to fixed bearing knees. It was not possible to determine fixed or mobile categories for all registered knees which accounts for the 3745 shortfall in the total number.

Revision Rates for Cruciate Retaining vs Posterior Stabilised

Prosthesis		No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Genesis II	CR	4507	24024	95	0.39	0.32	0.48
Genesis II	PS	2938	8990	62	0.69	0.53	0.88
Maxim	CR	656	4826	16	0.33	0.19	0.54
Maxim	PS	165	1305	5	0.38	0.12	0.89
Nexgen	CR	5771	30506	126	0.41	0.34	0.49
Nexgen	PS	7033	28867	186	0.64	0.55	0.74
Optetrak	CR	326	1014	7	0.69	0.28	1.42
Optetrak	PS	210	698	12	1.72	0.89	3.00
PFC Sigma	CR	5663	29185	98	0.34	0.27	0.41
PFC Sigma	PS	1845	7456	54	0.72	0.54	0.94
Triathlon	CR	6384	15548	64	0.41	0.32	0.53
Triathlon	PS	1562	4794	23	0.48	0.30	0.72
Vanguard	CR	628	1203	7	0.58	0.23	1.209
Vanguard	PS	209	286	4	1.40	0.38	3.58

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

CR	25523	112555	456	0.41	0.37	0.44
PS	14648	55441	393	0.71	0.64	0.78
Minimally	12041	75642	436	0.58	0.52	0.63

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

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	4903	24086	247	1.03	0.90	1.16
55_64	15606	76219	522	0.68	0.63	0.75
65_74	21954	108228	485	0.45	0.41	0.49
GE75	15826	75682	197	0.26	0.23	0.30

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

Revision vs Gender

Gender	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Female	30066	149505	706	0.47	0.44	0.51
Male	28223	134710	745	0.55	0.51	0.59

The revision rate for males is significantly higher than for females

Revision by Age Bands vs Arthroplasty Fixation

Cementation	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	3981	19051	170	0.89	0.76	1.04
55_64	13602	65323	436	0.67	0.61	0.73
65_74	19920	97462	437	0.45	0.41	0.49
GE75	14614	69592	175	0.25	0.22	0.29

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

Uncemented	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	488	2940	54	1.84	1.38	2.40
55_64	922	4960	48	0.97	0.71	1.28
65_74	828	3895	24	0.62	0.39	0.92
GE75	429	1811	7	0.39	0.16	0.80

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

Hybrid	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	434	2095	23	1.10	0.70	1.65
55_64	1082	5936	38	0.64	0.45	0.88
65_74	1206	6871	24	0.35	0.22	0.52
GE75	783	4280	15	0.35	0.20	0.58

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

Revision vs Approach

Approach	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Medial	52826	251161	1275	0.51	0.48	0.54
Lateral	919	5363	32	0.60	0.41	0.84
Other	1420	8285	32	0.39	0.26	0.55

There is no significant difference among the 3 approaches.

Revision vs Image Guidance

Image Guided	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
No	53741	272059	1377	0.51	0.48	0.53
Yes	4548	12156	74	0.61	0.48	0.76

There is no significant difference between the two groups.

Revision vs Surgeon Annual Output

Operations per year	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT10	1340	7689	35	0.46	0.32	0.63
10_25	12739	65069	380	0.58	0.53	0.65
25_50	27945	137026	657	0.48	0.44	0.52
50_75	12038	54661	282	0.52	0.46	0.58
75_100	1694	8221	29	0.35	0.24	0.51
GE100	2523	11494	68	0.59	0.46	0.75

The 75-100 group have a significantly lower revision rate than the 10-25 and > 100 output group and the10-25 output group significantly higher revision rate than the 25-50 output group

Revision vs ASA Status

ASA Class	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1	4214	12454	75	0.60	0.47	0.75
2	23206	69699	407	0.58	0.53	0.64
3	8965	26496	153	0.58	0.49	0.68
4	173	489	4	0.82	0.22	2.09

There is no significant difference among the 4 classes

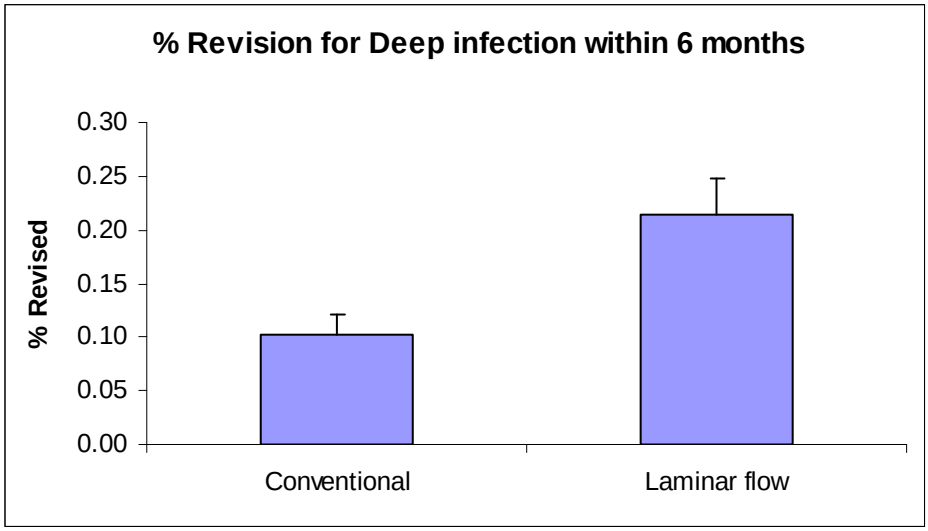
Revision vs ASA public private hospitals

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Public	18805	56670.74	333	0.59	0.53	0.65
Private	17753	52467.03	306	0.58	0.52	0.65

There is no significant difference between the 2 groups

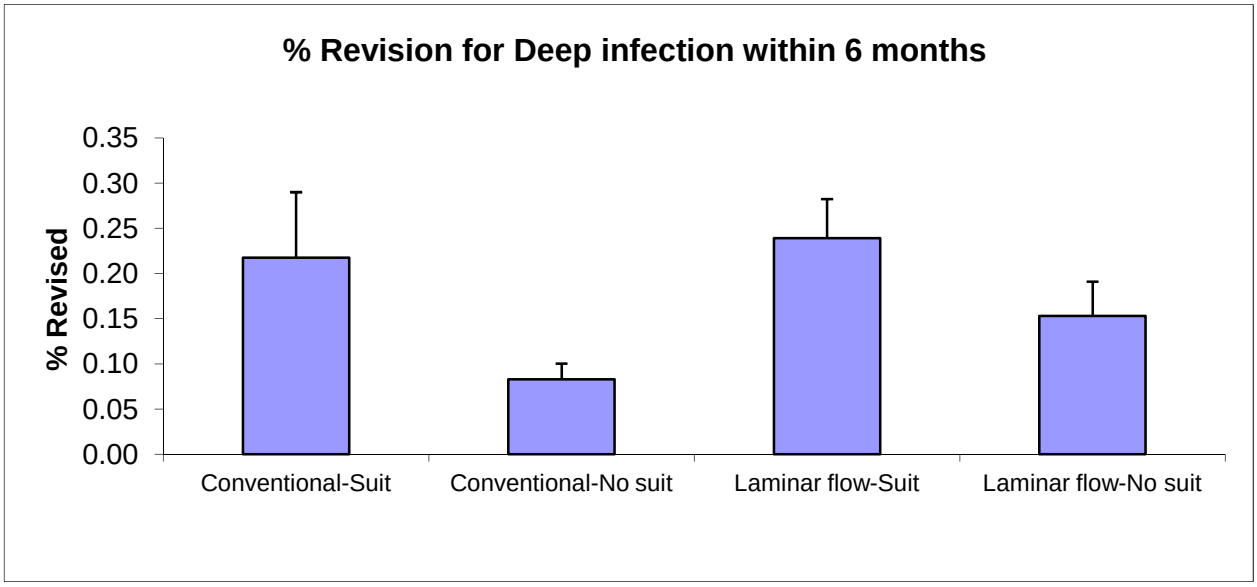
Revision for Deep Infection within 6 months versus Theatre Environment

	Total Number	Number Revised	%	Std Error
Conventional	31835	32	0.10052	0.01776
Laminar flow	23030	46	0.19974	0.02942



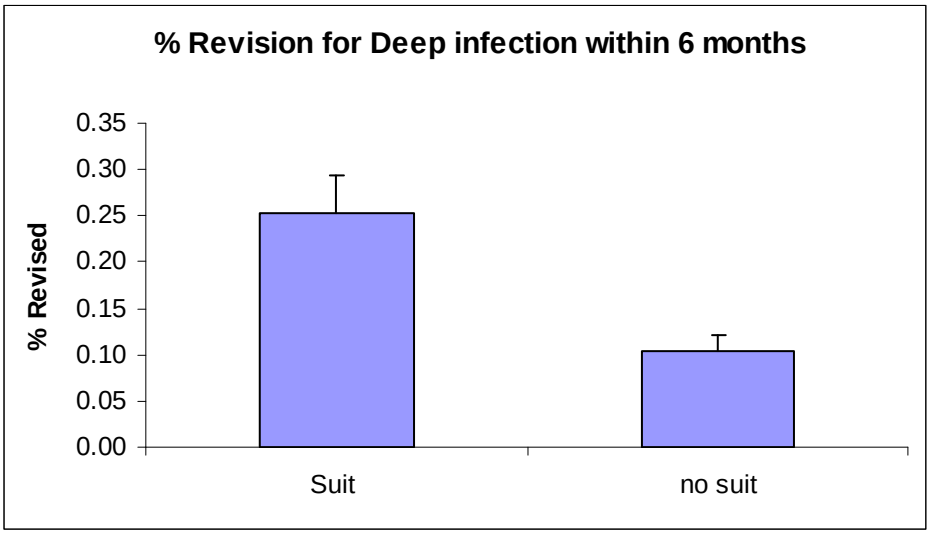
As with hip arthroplasty there is a significant difference in knee revision rates (2x) for deep infection within 6 months of surgery between conventional and laminar flow theatres.

	Total Number	Number Revised	%	Std Error
Conventional Suit	4138	9	0.22	0.07
Conventional No suit	27697	23	0.08	0.02
Laminar flow Suit	12559	30	0.24	0.04
Laminar flow No suit	10471	16	0.15	0.04



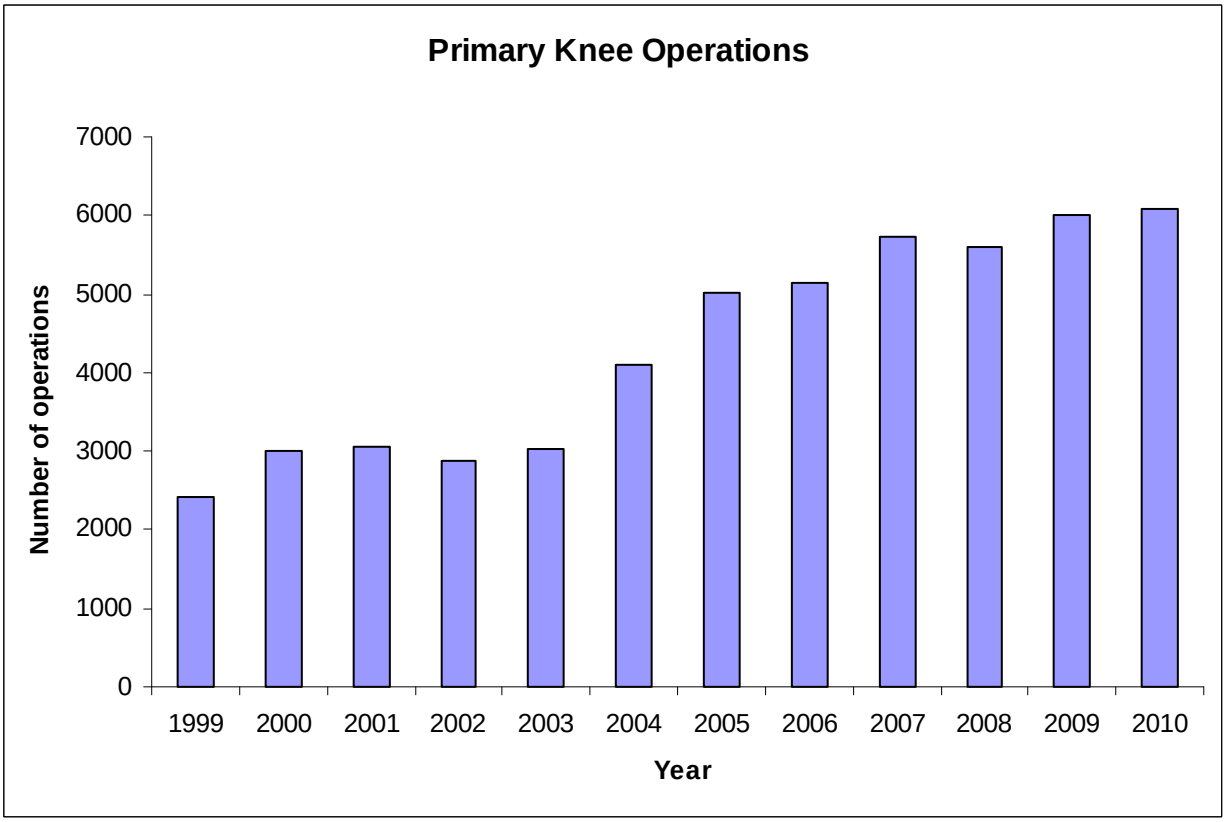
There is a significant difference in the revision rates between conventional/no suit and the conventional/suit (2.6x) and laminar /suit (3x) environments.

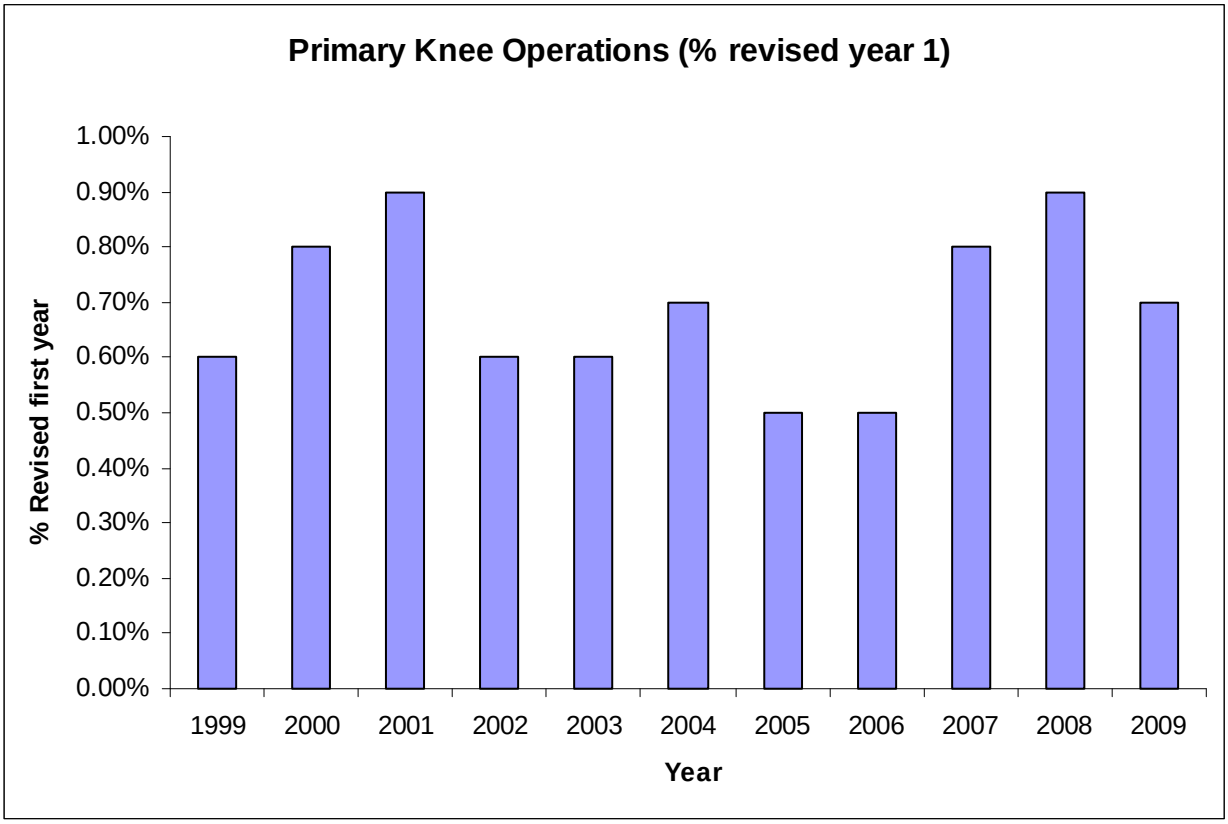
	Total Number	Number Revised	%	Std Error
Suit	16697	39	0.23	0.04
no suit	38168	39	0.10	0.02



Furthermore there is a significant increase in revision rates (2.3x) when suits are used in either conventional or laminar flow theatres.
From the above data it would seem that, similar to hip arthroplasty, the use of space suits significantly increases the risk of deep infection within the first 6 months following the arthroplasty and that there is no advantage to using laminar flow theatres.

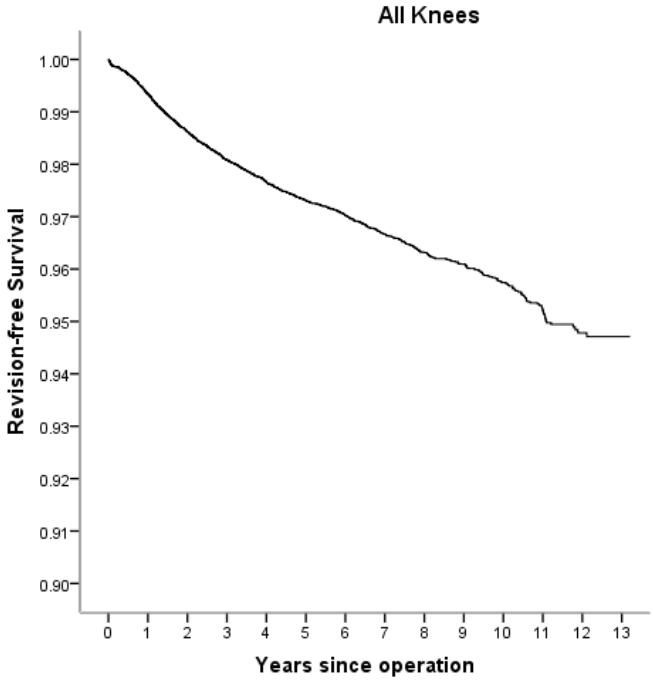
Percentage of Knees Revised in the First Year




Primary Knee Operations (% revised year 1)
% Revised first year
1.00%
0.90%
0.80%
0.70%
0.60%
0.50%
0.40%
0.30%
0.20%
0.10%
0.00%
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year

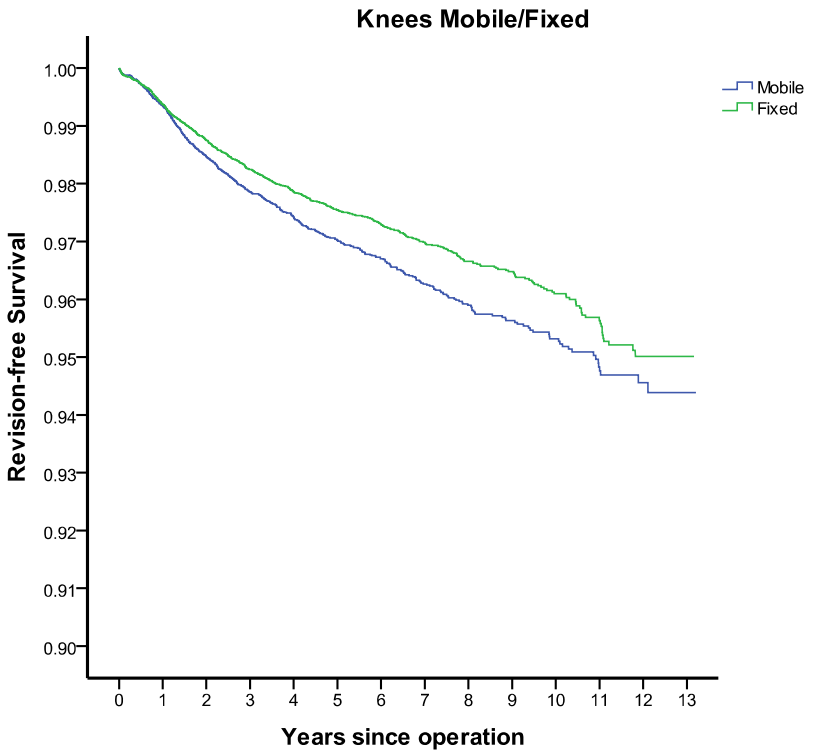
Kaplan Meier Curves

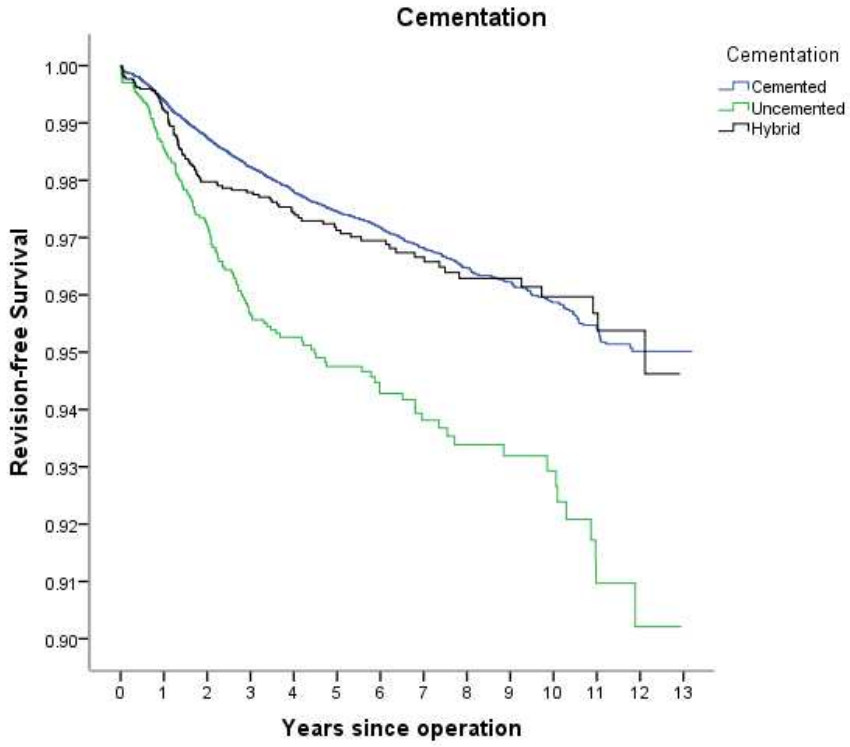
The following Kaplan Meier survival analyses are for years 1999 – 2011 with deceased patients censored at time of death



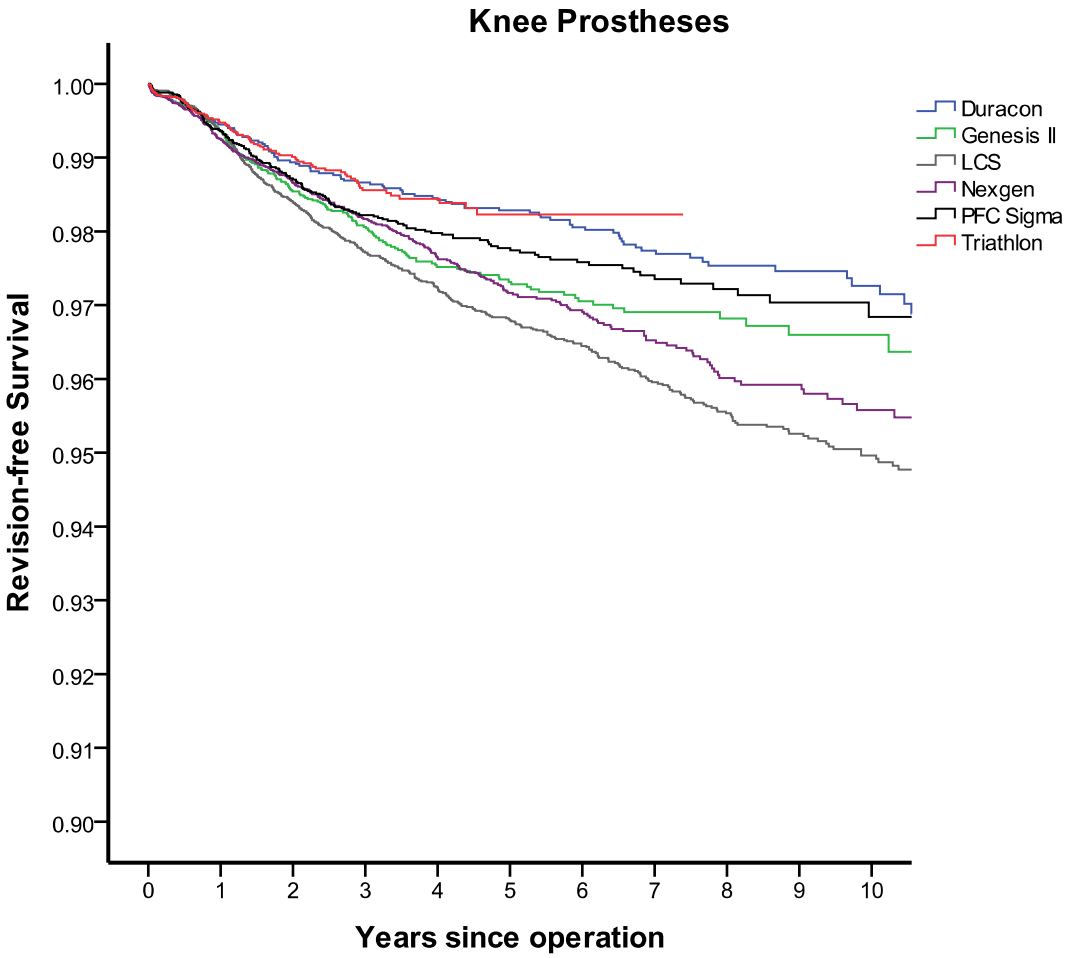
Years	% Revision-free	No in each year
1	99.34	51185
2	98.62	44225
3	98.08	37556
4	97.67	31445
5	97.31	25373
6	97.02	20083
7	96.67	15148
8	96.31	11264
9	96.09	8375
10	95.74	5877
11	95.23	3503
12	94.77	1471

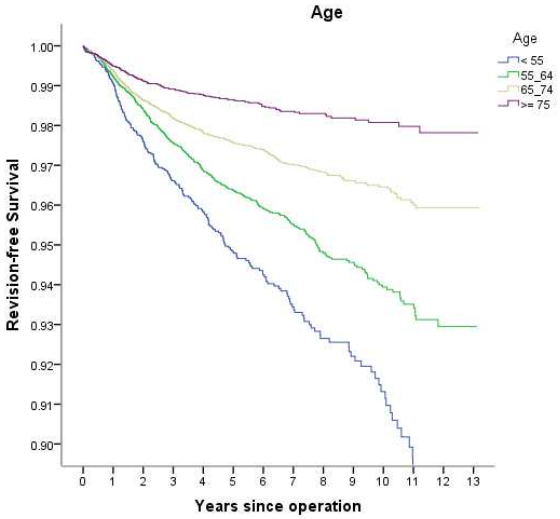
The KM analysis is to 12 years rather than 13 as too few registered knees were revised in 2011

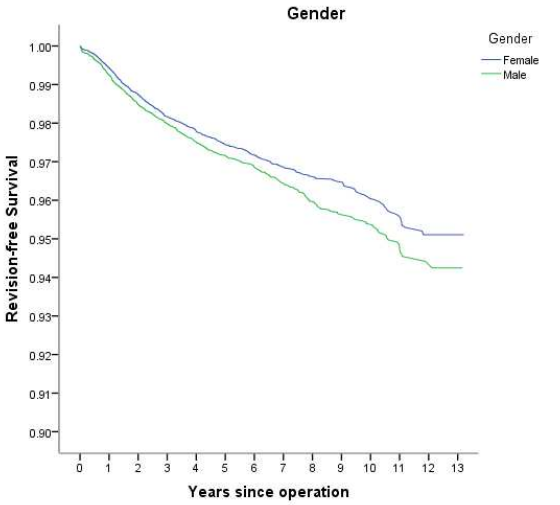

Knees Mobile/Fixed
Mobile
Fixed
Revision-free Survival
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Years since operation

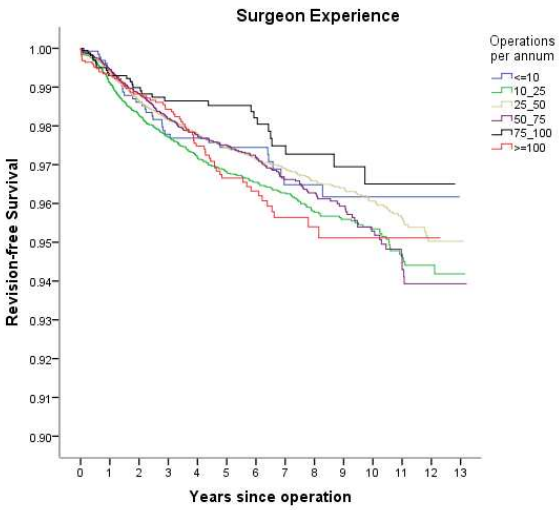

Cementation
Cementation
Cemented
Uncemented
Hybrid
Revision-free Survival
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Years since operation

Survival Curve to 10 years for 6 knee prostheses




Age
Age
< 55
55_64
65_74
>= 75
Revision-free Survival
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
0.91
0.90
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Years since operation


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


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

KNEE RE-REVISIONS

Analysis was undertaken of re-revisions.
There were 188 registered primary knee revisions that had been revised twice, 32 that had been revised 3 times, 5 that had been revised 4 times, 2 that had been revised 5 times and 1 that had been revised 6 times.

Second revision 188

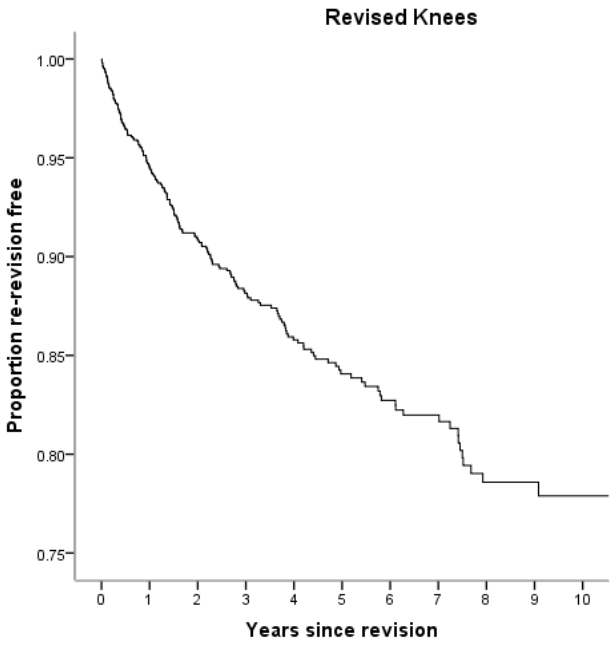
Time between the first and second revision for the 188 knee arthroplasties averaged 754 days, with a range of 2 – 3318 and a standard deviation of 743 days.
This compares to an average of 1064 days between primary and first revision arthroplasty.

Reason for revision	
Deep infection	80
Pain	47
Loosening tibial component	35
Loosening femoral component	26
Instability	14
Dislocation	7
Stiffness	7
Patellar fracture	2
Loosening patellar component	2
Fracture femur	1
Other	13

Second Revisions

Number of primary revisions	Observed comp. Yrs	Number of Second Re-Revisions	Rate/100-component-years	Exact 95% confidence interval	
1234	4349	149	3.43	2.90	4.02

Kaplan Meier survival curve for first revision knee arthroplasties



Years	Percentage re-revision free
1	93.73
2	90.41
3	87.77
4	85.45
5	83.85
6	82.21
7	81.62
8	78.51
9	77.80
10	77.80

Third revision 32
The average time between second and third revisions for the 32 knee arthroplasties was 702 days, with a range of 28 – 2212 and a standard deviation of 610 days.

Fourth revision 4
The average time between third and fourth revisions for the 4 knee arthroplasties was 389 days, with a range of 23 – 1454 and a standard deviation of 606 days.

Fifth revision 2
The average time between fourth and fifth revisions for the 4 knee arthroplasties was 353 days.

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

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

Questionnaires at six-months post surgery

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

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

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

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

This groups each score into four categories;

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

For the thirteen-year period and as at July 2012, there were 19,582 primary knee questionnaire responses registered at six months post surgery.
The mean knee score was 37.28 (standard deviation 8.16, range 48 – 1)

Scoring > 41	**7292**
Scoring 34 – 41	6952
Scoring 27 – 33	3092
Scoring < 27	2246

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

Questionnaires at five year's post surgery

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

This dataset represents sequential Oxford knee scores for 5,959 individual patients.

At five years post surgery, 82% of patients achieved an excellent or good score and had a mean of 40.01.

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 2681 individual patients.

At ten years post surgery, 80% of patients achieved an excellent or good score and had a mean of 39.46.

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

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

Percentage scoring 0 or 1(worst categories) for each question out of the group of 19,582 primary knee responses at six-months, 5,959 at five years and 2,681 at ten years.

		%6	%5	%10
1	Moderate or severe pain from the operated knee	13	8	9
2	Only able to walk around the house or unable to walk before pain becomes severe	5	4	4
3	Extreme difficulty or impossible to get in and out of a car or public transport	4	4	5
4	Extreme difficulty or impossible to kneel down and get up afterwards	42	40	44
5	Extreme difficulty or impossible to do the household shopping on your own	4	4	5
6	Extreme difficulty or impossible to wash and dry yourself	1	1	2
7	Pain interfering greatly or totally with your work	5	4	4
8	Very painful or unbearable to stand up from a chair after a meal	4	2	2
9	Most of the time or always feeling that the knee might suddenly "give way"	2	2	2
10	Limping most or every day	11	8	7
11	Extreme difficulty or impossible to walk down a flight of stairs	7	7	8
12	Pain from your knee in bed most or every nights	10	4	5

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

Revision knee questionnaire responses

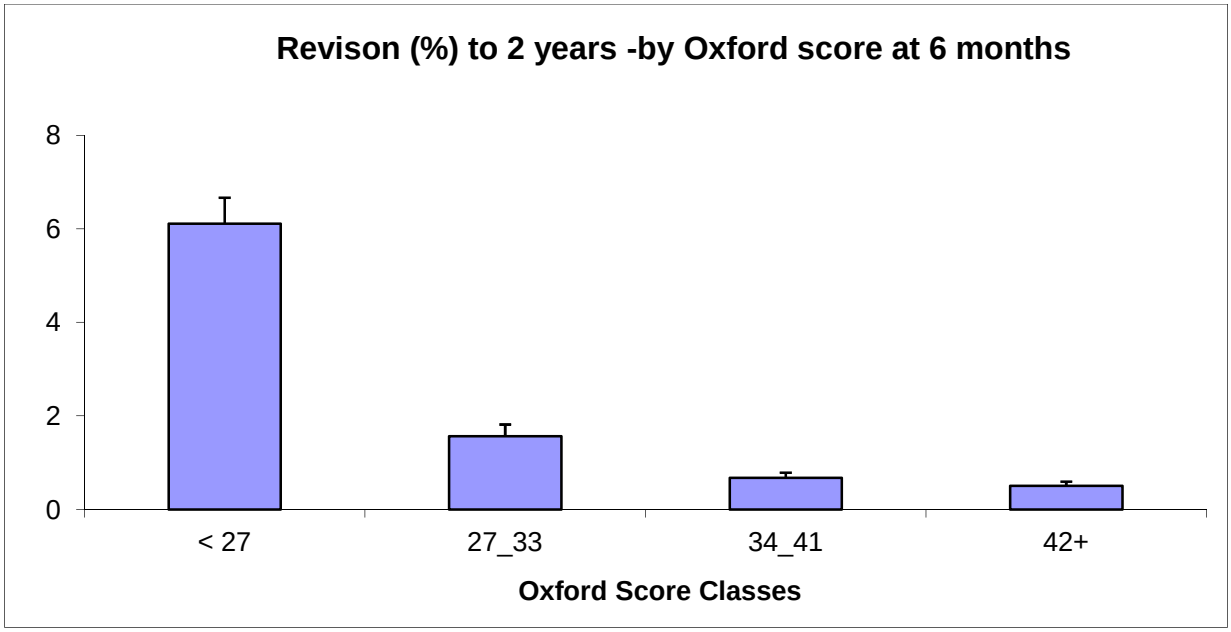
There were 2,417 revision hip responses with 52% achieving an excellent or good score. This group includes all revision knee procedures. The mean revision hip score was 32.88 (standard deviation 10.11, range 48 – 3)

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

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

Six month score and revision arthroplasty

By plotting the patients six month scores in the Kalairajah groupings, against the proportion of knees revised for that same group it demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 12 times the risk of a revision within 2 years compared to a person with a score >41



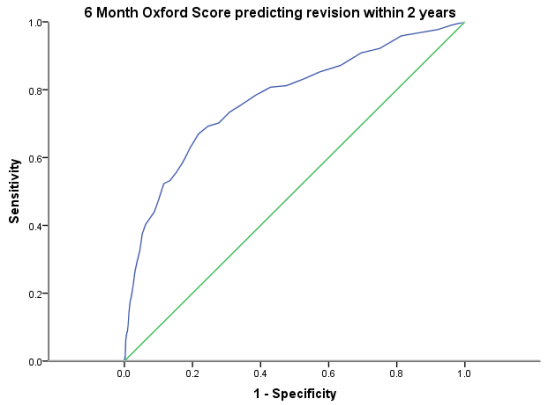
Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date

Kalairajah group	No in group	No. revised	%	Std error
< 27	1866	114	6.11	0.55
27_33	2489	39	1.57	0.25
34_41	5457	37	0.68	0.11
42+	5569	28	0.50	0.09

A person with an oxford score >42 has a 0.50% risk of revision within two years compared to a 6.11 % risk with a score of 27 or less

A ROC analysis has demonstrated that a patient with a score less than or equal to 32.5 has 7 times the risk of needing a revision within 2 years compared to a person with a score greater than 32.5.
Alternatively the ROC analysis predicted 73% of the revisions within 2 years from just the lowest 30% of Oxford scores.

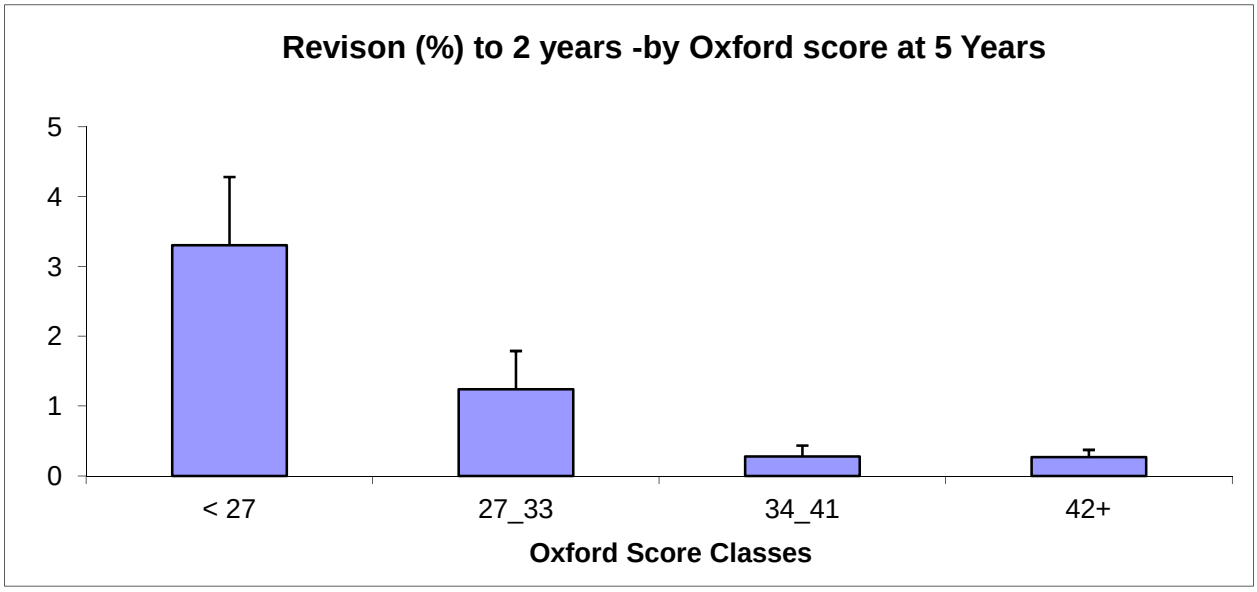
ROC curve at six months versus revision within two years



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

Five year score and revision arthroplasty

As with the six month scores, plotting the patients 5 year scores in the Kalairajah groupings against the proportion of knees revised for that same group demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 12 times the risk of a revision within 2 years compared to a person with a score >41



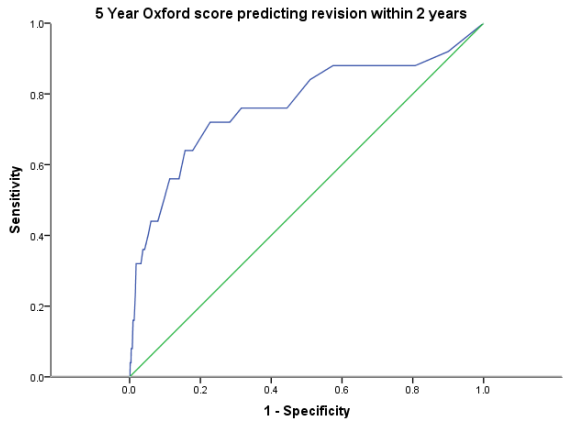
Revision risk versus Kalairajah groupings of Oxford scores within two years of the 5 year score date

Kalairajah groups	No in group	No. revised	%	Std error
< 27	333	11	3.30	0.98
27_33	403	5	1.24	0.55
34_41	1079	3	0.28	0.16
42+	2250	6	0.27	0.11

A person with an Oxford score >42 has a 0.27 % risk of revision within two years compared to a 3.30% risk with a score of 27 or less.

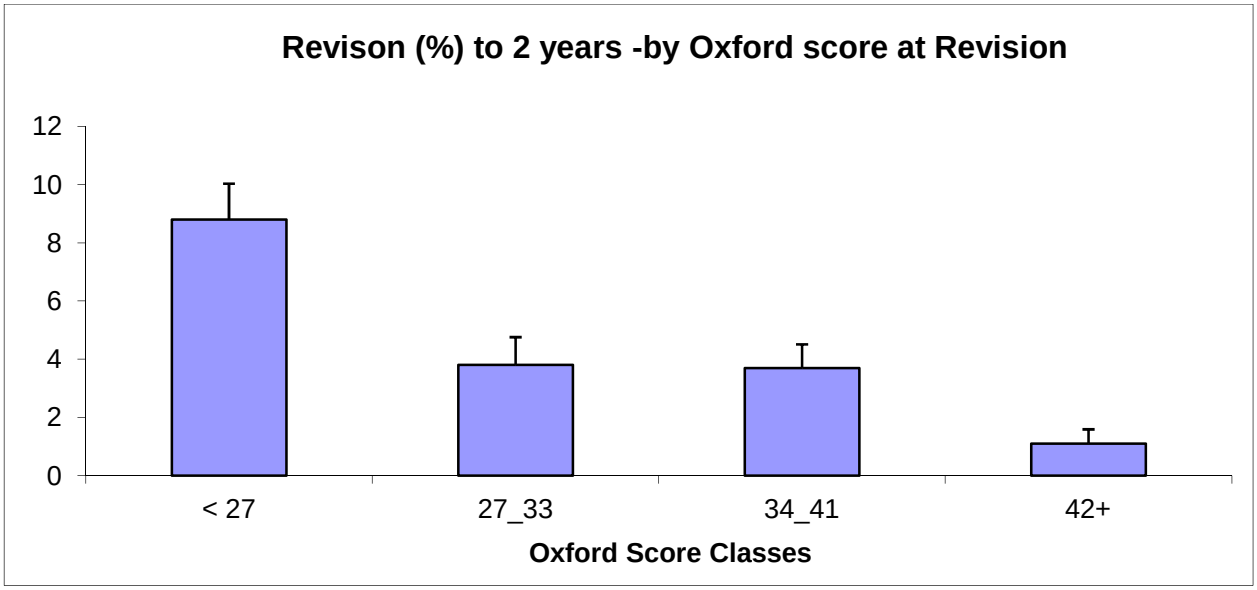
The ROC analysis at 5 years has demonstrated that a patient with a score less than or equal to 35.5 has 9 times the risk of needing a revision within 2 years compared to a person with a score greater than 35.5.
Alternatively the ROC analysis predicted 75% of the revisions within 2 years from just the lowest 30% of Oxford scores.

ROC curve at five years versus revision within two years



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

Prediction of second revision from six month score following first revision.
By plotting the patients six month scores following their first revision in the Kalairajah groupings, against the proportion of knees revised for that same group it again demonstrates that there is an incremental increase in risk during the next 2 years related to the Oxford score. A patient with a score below 27 has 8 times the risk of a revision within 2 years compared to a person with a score >41



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

Kalairajah groups	Revision to 2 yrs	No. revised	%	Std error
< 27	523	46	8.80	1.24
27_33	395	15	3.80	0.96
34_41	541	20	3.70	0.81
42+	454	5	1.10	0.49

A person with a 6 month Oxford score >42 has a 1.10 % risk of revision within two years compared to a 8.80% risk with a score < 27

UNICOMPATMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **twelve** year report analyses data for the period January 2000 – December 2011. There were 6,621 unicompartmental knee procedures registered, an additional 585 compared to last year's report and an increase of just 2 over the 2010 registrations.

2000	**340**
2001	430
2002	533
2003	634
2004	634
2005	558
2006	584
2007	576
2008	540
2009	624
2010	583
2011	585

DATA ANALYSIS

Age and sex distribution

The average age for a unicompartmental knee replacement was 66.38 years, with a range of 33.05 – 94.71 years.

	Female	Male
Number	3126	3495
Percentage	47.21	52.79
Mean age	66.22	66.51
Maximum age	94.71	93.42
Minimum age	33.05	35.24
Standard dev.	10.15	9.03

Body Mass Index

For the 2 year period 2010 - 2011, there were 676 BMI registrations for unicompartmental knee replacements. The average was 29.53 with a range of 17 – 47.8 and a standard deviation of 4.99.

Previous operation

None	5237
Menisectomy	1031
Arthroscopy/debridement	308
Internal fixation	26
Osteotomy	23
Ligament reconstruction	26
Arthrotomy	3
Synovectomy	3
Other	14

Diagnosis

Osteoarthritis	6462
Avascular necrosis	51
Post ligament disruption	30
Other inflammatory	19
Rheumatoid arthritis	13
Post fracture	13
Tumour	1
Other	13

Approach

Medial	5051
Minimally invasive surgery	1556
Other	198
Lateral	141
Image guided surgery	15

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

Cement

Femur cemented	5517	83%
Antibiotic in cement	3404	62%
Tibia cemented	5613	85%
Antibiotic in cement	3470	62%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	5361	96%

Operating theatre

Conventional	4775
Laminar flow	1769
Space suits	1644

ASA Class

This was introduced with the updated forms at the beginning of 2005.
For the seven year period 2005 – 2011, there were 3,765 (93%) 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	729	19
2	2483	65
3	588	15
4	10	1

Operative time (skin to skin)

Mean	78 minutes
Standard deviation	24 minutes
Minimum	24 minutes
Maximum	217 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the seven- year period 2005 – 2011.

Consultant	3812
Advanced trainee supervised	213
Advanced trainee unsupervised	12
Basic trainee	10

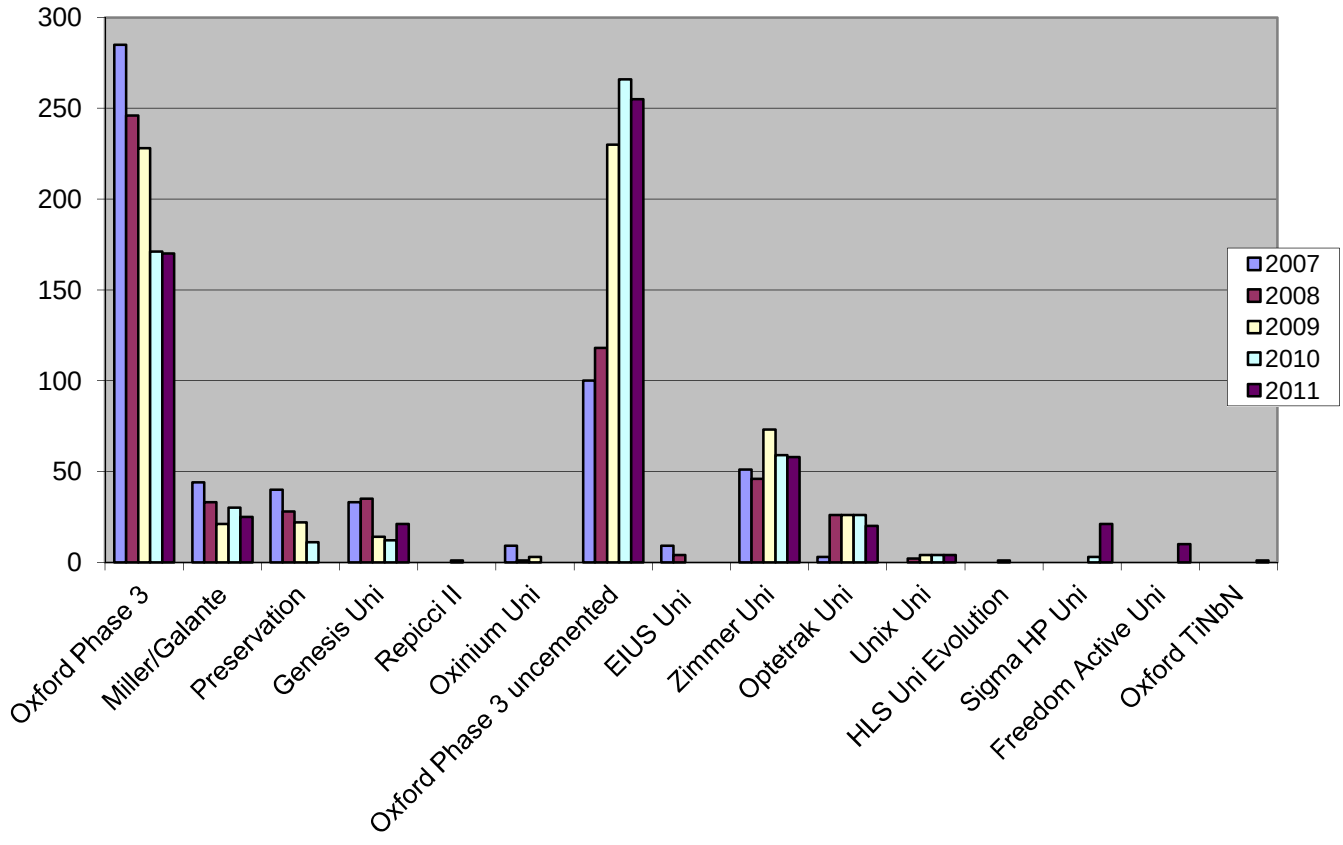
Prosthesis usage

Unicompartmental knee prostheses used in 2011

Oxford Phase 3 uncemented	255
Oxford Phase 3	170
Zimmer Uni	58
Miller/Galante	25
Sigma HP Uni	21
Genesis Uni	21
Optetrak Uni	20
Freedom Active Uni	10
Unix Uni	4
Oxford TiNbN coated	1

The Freedom Active Uni has replaced the Preservation from 2010.

Most Used Unicompartmental Prostheses 2007 - 2011



Surgeon and hospital workload

Surgeons
In 2011, 70 surgeons performed 585 unicompartmental knee replacements, an average of 8 procedures per surgeon.
37 surgeons performed less than 5 procedures and 11 performed more than 15 procedures.

Hospitals
In 2011 unicompartmental knee replacement was performed in 34 hospitals. 17 were public and 17 were private.
For 2011 the average number of unicompartmental knee replacements per hospital was 17.

REVISION OF REGISTERED PRIMARY UNICOMPARTMENTAL ARTHROPLASTIES

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

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

There were 445 revisions of the 6,621 registered unicompartmental knee replacements (6.7%).

A further 42 had a second revision, 5 a third revision and 1 a fourth revision.

374 of the 445 (84%) were revised to total knee replacements and 71 (16%) were revised to further unicompartmental replacements.

Time to revision

Mean	1186 days
Maximum	4039 days
Minimum	10 days
Standard deviation	973 days

Reason for revision

Pain	171
Loosening tibial component	100
Loosening femoral component	65
Progression of disease	33
Bearing dislocation/wear	41
Deep infection	16
Fracture tibia	17
Fracture femur	1
Other	38

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

Analysis by time of the 3 main reasons for revision

		Years since operation													
		0	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	Count	9	24	53	25	10	19	9	6	9	2	4	1	0	171
	%	5.30	14.00	31.00	14.60	5.80	11.10	5.30	3.50	5.30	1.20	2.30	0.60	0.00	
2	Count	8	17	32	8	7	9	4	7	5	1	2	0	0	100
	%	8.00	17.00	32.00	8.00	7.00	9.00	4.00	7.00	5.00	1.00	2.00	0.00	0.00	
3	Count	0	12	17	6	10	3	5	2	5	4	1	0	0	65
	%	0.00	18.50	26.20	9.20	15.40	4.60	7.70	3.10	7.70	6.20	1.50	0.00	0.00	

1 = Pain, 2 = Loosening tibial component, 3 = Loosening femoral component

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

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

Rate/100 component years
This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revision rate. These rates are usually very low, hence are expressed per 100 component years rather than per component year. Statisticians consider that this is

a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow up times. It is also important to note the confidence intervals. The closer they are to the estimated revision rate/100 component years, the more precise the estimate is.

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

All Primary Unicompartmental Knee Arthroplasties

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
	6621	33848	445	1.31	1.20	1.44

Revision Rate of Individual Unicompartmental Knee Prostheses Sorted Alphabetically

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
EIUS Uni Knee	22	106	0	0.00	0.00	3.49
Freedom Active Uni	10	2.6	0	0.00	0.00	140.35
Genesis Uni	350	1961	31	1.58	1.07	2.24
HLS Uni Evolution	1	0.5	1	193.25	4.89	1076.74
LCS Uni	6	49	2	4.10	0.50	14.82
Miller/Galante	697	4477	41	0.92	0.66	1.24
Optetrak Unicondylar Cemented	101	223	1	0.45	0.00	2.50
Oxford Phase 3	3437	20148	283	1.40	1.25	1.58
Oxford Phase 3 uncemented	1050	2351	14	0.60	0.33	1.00
Oxford TiNbN coated	1	0.5	0	0.00	0.00	816.58
Oxinium Uni	33	140	10	7.15	3.43	13.15
Preservation	484	2820	44	1.56	1.13	2.09
Repicci II	97	834	12	1.44	0.74	2.51
Sigma HP Uni	24	14	0	0.00	0.00	26.27
Unix Uni	14	24	0	0.00	0.00	15.13
Zimmer Unicompartmental Knee	294	697	6	0.86	0.32	1.87

The oxinium uni has a very significantly higher revision rate, but despite widely varying revision rates for the other prostheses there are no significant differences because of the relatively small numbers & wide CIs. No oxinium unis were recorded for 2011.
The uncemented Oxford Uni has a significantly lower revision rate than the overall mean of 1.31/100ocys.

Revision vs Arthroplasty Fixation

Fixation	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	5497	31187	427	1.37	1.24	1.51
Uncemented	988	2323	16	0.69	0.39	1.12
Hybrid	136	337	2	0.59	0.07	2.14

The uncemented unis have a 50% lower revision rate than cemented unis and for the first time is statistically significant.

Revision vs Age Bands

Age Groups	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	800	4060.4	74	1.82	1.43	2.29
55_64	2265	11623.6	195	1.68	1.45	1.93
65_74	2217	11670.5	120	1.03	0.85	1.23
GE75	1339	6493.3	56	0.86	0.65	1.12

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

Revision vs Gender

Gender	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Female	3126	16085	218	1.36	1.18	1.55
Male	3495	17762	227	1.28	1.12	1.46

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

Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
<10	3448	18555	281	1.51	1.34	1.70
>=10	3157	15217	161	1.06	0.90	1.23

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

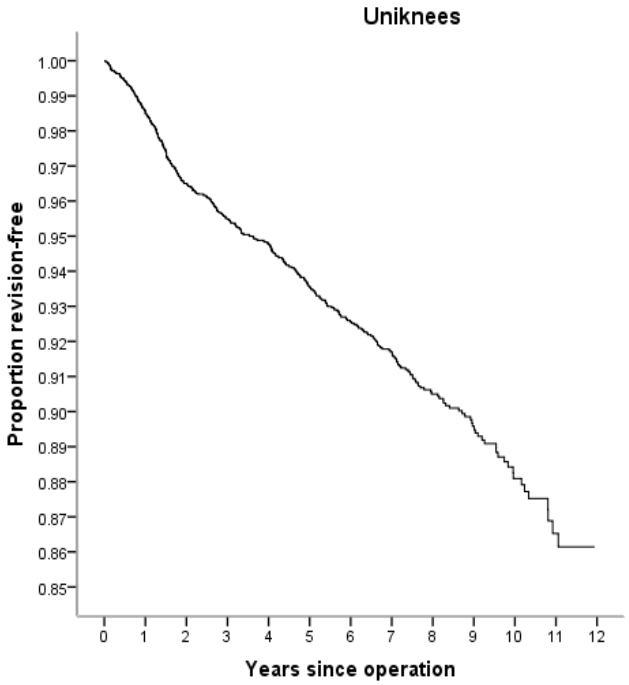
Revision vs Surgical Approach

Approach	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Minimally-Invasive	1556	6350.5	63	0.99	0.76	1.27
Standard Approach	5065	27497.2	382	1.39	1.25	1.54

The minimally invasive technique has a significantly lower revision rate despite some C.I. overlap.

Kaplan Meier Curves

The following Kaplan Meier survival analyses are for years 2000 to 2010 with deceased patients censored at time of death.



Years	% Revision-free	N
1	98.18	5914
2	96.29	5186
3	95.33	4478
4	94.43	3864
5	93.30	3237
6	92.37	2626
7	91.29	2084
8	90.38	1500
9	89.19	959
10	87.95	533

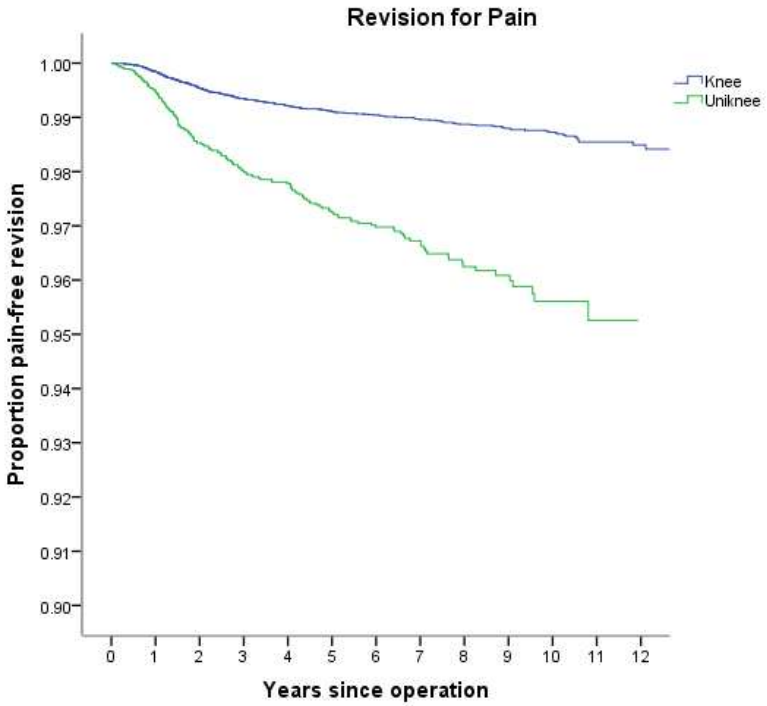
Numbers too few for accurate percentage survival beyond 10 years.

Revision Rate for Re-revisions

Re Revisions	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Revised to full	374	1595.0	30	1.88	1.27	2.69
Revised to Uni	71	249.4	12	4.81	2.49	8.41

When compared to the primary total knee arthroplasty revision rate of 0.54 @ the 95% confidence interval there is a significantly increased revision rate when a unicompartmental arthroplasty is converted to a total knee arthroplasty. This statistic is even more significant following conversion of a unicompartmental to a further unicompartmental arthroplasty. Further evidence is that the average six month Oxford score following conversion of a unicompartmental to total arthroplasty is similar to that for a revised primary total knee arthroplasty.

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



	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Uniknees	6621	33848	171	0.505	0.432	0.587
Knees	58289	284215	450	0.158	0.144	0.174

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

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

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

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

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

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

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

For the twelve year period and as at August 2012, there were 4,579 unicompartmental knee questionnaire responses registered at six months post surgery.
The mean unicompartmental knee score was 39.23 (standard deviation 7.36, range 3 – 48)

Scoring	> 41	2213
Scoring	34 - 41	1479
Scoring	27 - 33	549
Scoring	< 27	320

At six months post surgery, 81% had an excellent or good score.

Questionnaires at five years post surgery
Patients who had a registered six month questionnaire and who had not had revision surgery were sent a further questionnaire at five years post surgery.

This dataset represents sequential Oxford knee scores for 1481individual patients.

At five years post surgery, 88 % of patients had achieved an excellent or good score and had a mean of 41.29.

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 344 individual patients.

At ten years post surgery, 84% of patients achieved an excellent or good score and had a mean of 40.58.

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

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

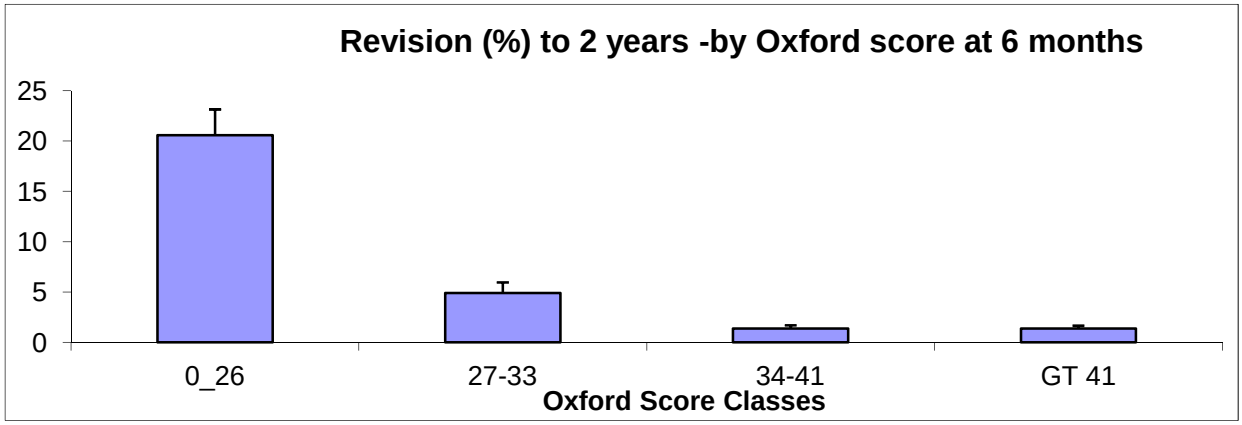
Percentage scoring 0 or 1 for each question out of the group of 4,579 at six months post surgery and 1,481 at five years and 344 at ten years.

		% 6m	% 5yr	% 10yr
1	Moderate or severe pain from the operated knee	10	8	10
2	Only able to walk around the house or unable to walk before pain becomes severe	3	2	4
3	Extreme difficulty or impossible to get in and out of a car or public transport	2	1	2
4	Extreme difficulty or impossible to kneel down and get up afterwards	32	28	30
5	Extreme difficulty or impossible to do the household shopping on your own	1	1	3
6	Extreme difficulty or impossible to wash and dry yourself	0.5	0.3	0.8
7	Pain interfering greatly or totally with your work	3	3	3
8	Very painful or unbearable to stand up from a chair after a meal	3	2	2
9	Most of the time or always feeling that the knee might suddenly “give way"	2	1	3
10	Limping most or every day	8	6	6
11	Extreme difficulty or impossible to walk down a flight of stairs	3	3	5
12	Pain from your knee in bed most or every nights	7	4	5

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

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

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

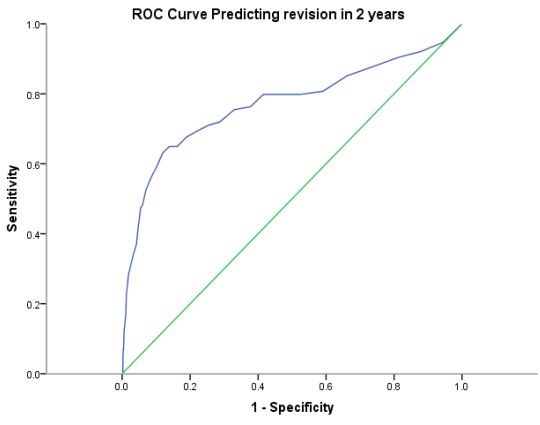


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date

Kalairajah group	No in Group	No. revised	%	Std error
0_26	260	55	21.15	2.53
27-33	461	22	4.77	0.99
34-41	1163	14	1.20	0.32
GT 41	1657	23	1.39	0.29

A person with an oxford score >42 has a 1.39% risk of revision within two years compared to a 21.15% risk with a score of < 27.

A ROC analysis has demonstrated that a patient with a score less than 32 has 10 times the risk of needing a revision within 2 years compared to a person with a score greater or equal to 32
Alternatively the ROC analysis predicted 72% of the revisions within 2 years from just the lowest 30% of Oxford scores.



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

ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **twelve-** year report analyses data for the period January 2000 – December 2011. There were 837 primary ankle procedures registered, an additional 109 compared to last year's report but at 13% decrease compared to 2010.

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

DATA ANALYSIS

Age and sex distribution

The average age for an ankle replacement was 65.28 years, with a range of 32.32 – 88.38 years.

	Female	Male
Number	315	522
Percentage	37.63	62.37
Mean age	63.25	66.51
Maximum age	85.84	88.38
Minimum age	32.32	34.15
Standard dev.	9.40	8.49

Body Mass Index

For the two-year period 2010 - 2011, there were 88 BMI registrations for primary ankle replacements. The average was 27.93 with a range of 17 – 43 and a standard deviation of 4.46.

Previous operation

None	661
Internal fixation for juxtarticular fracture	86
Arthroscopy/debridement	34
Arthrodesis	25
Osteotomy	16
Reconstruction/repair	6
Other	8

Diagnosis

Osteoarthritis	612
Post trauma	149
Rheumatoid arthritis	80
Other inflammatory	10
Avascular necrosis	2
Other	15

Approach

Anterior	733
Anterolateral	33
Other	8

Bone graft

Tibia autograft	36
Tibia allograft	3
Talus autograft	6
Talus allograft	3

Cement

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

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	803	(96%)

Operating theatre

Conventional	445
Laminar flow	387
Space suits	157

ASA Class

This was introduced with the updated forms at the beginning of 2005.
For the seven-year period 2005 -2011, there were 599 (87%) primary ankle procedures with the ASA class recorded.

Definitions

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

ASA	Number
1	123
2	374
3	100
4	2

Operative time (skin to skin)

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

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the seven-year period 2005 -2011.

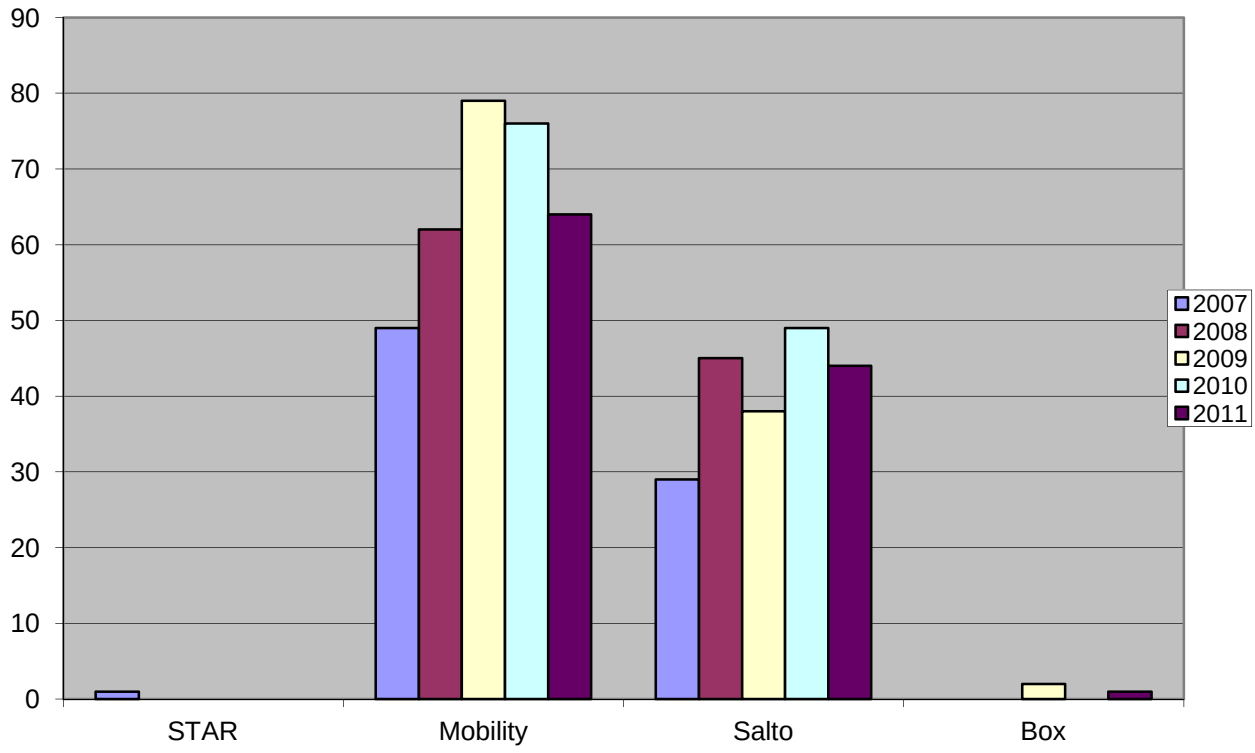
Consultant	684
Advanced trainee supervised	5

Prosthesis usage

Ankle prostheses used in 2011

Mobility	64
Salto	44
Box	1

MOST USED ANKLE PROSTHESES 2007 - 2011



Surgeon and hospital workload

Surgeons

In 2011, 16 surgeons performed 109 primary ankle procedures, an average of 7 procedures per surgeon. 3 surgeons performed more than 15 procedures and 2 performed 1 procedure.

Hospitals

In 2011 primary ankle replacement was performed in 22 hospitals. 9 were public and 13 were private.

REVISION ANKLE ARTHROPLASTY

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

Data analysis

For the twelve-year period January 2000– December 2011, there were 64 revision ankle procedures registered. The average age for an ankle revision was 64.47 years, with a range of 42.13 – 83.06.

	Female	Male
Number	21	43
Percentage	32.81	67.19
Mean	62.15	66.64
Maximum age	78.98	83.06
Minimum age	42.13	49.04
Standard dev.	11.67	7.71

REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

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

There were 44 revisions of the primary group of 837 (5.26%) and 5 re-revisions.

Time to revision

Mean	1180 days
Maximum	3388 days
Minimum	21 days
Standard deviation	831 days

Reason for revision

Pain	21
Loosening talar component	18
Loosening tibial component	8
Deep infection	3
Other	12

Analysis by time of the 2 main reasons for revision

		Years since operation											
		0	1	2	3	4	5	6	7	8	9	10	Total
1	Count	1	1	0	3	3	5	3	1	0	0	1	18
	%	5.60	5.60	0.00	16.70	16.70	27.80	16.70	5.60	0.00	0.00	5.60	
2	Count	0	2	6	2	3	5	1	1	0	0	1	21
	%	0.00	9.50	28.60	9.50	14.30	23.80	4.80	4.80	0.00	0.00	4.80	100.00

1 = Loosening talar component , 2 = Pain

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

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

Rate/100 component years
This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of post operative follow up in calculating the revisionrate. 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	
837	3197	44	1.38	1.00	1.85

Revision vs Prosthesis Type Sorted in Alphabetical Order

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Agility	119	914	14	1.53	0.84	2.57
Box	3	6	0	0.00	0.00	66.21
Mobility	414	1195	17	1.42	0.83	2.28
Ramses	11	70	2	2.87	0.35	10.37
Salto	243	681	4	0.59	0.16	1.50
STAR	47	332	7	2.11	0.85	4.34

Revision vs Gender

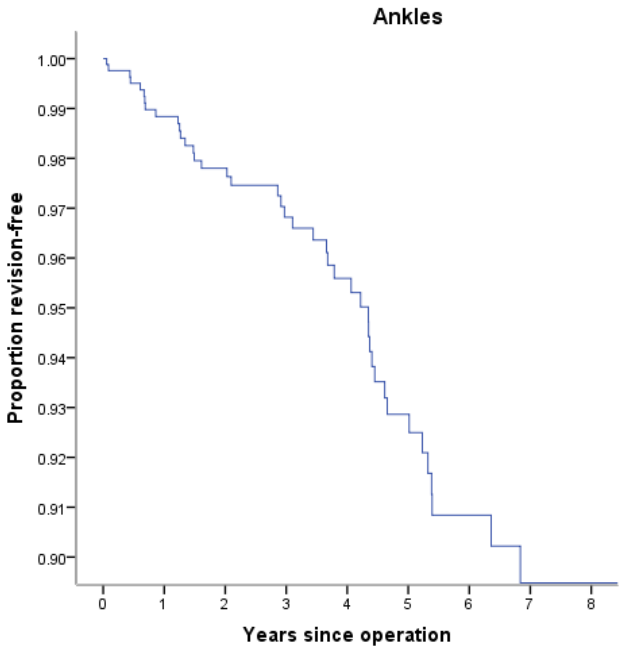
Gender	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Females	315	1252	14	1.12	0.61	1.88
Males	522	1945	30	1.54	1.04	2.20

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	94	402	8	1.99	0.86	3.92
55_64	303	1210	17	1.40	0.82	2.25
65_74	325	1190	17	1.43	0.83	2.29
GE75	115	395	2	0.51	0.06	1.83

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 11 years, 2000 to 2010 with deceased patients censored at time of death



Years	% Revision-free	No in each year
1	98.80	724
2	97.80	629
3	96.80	451
4	95.60	363
5	92.90	281
6	90.80	216
7	89.50	121

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

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

At six month post surgery patients are sent the Oxford-12 questionnaire. This is modelled on the Oxford 12, but is not validated.

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

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

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

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

For the twelve year period and as at August 2012, there were 643 primary ankle questionnaire responses registered at six months post surgery.
The mean primary ankle score was 33.33 (standard deviation 9.61, range 2 – 48)

Scoring	**> 41**	**149**
Scoring	34 - 41	209
Scoring	27 - 33	126
Scoring	< 27	159

At six months post surgery, 56% had an excellent or good score.

Questionnaires at five years post surgery

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

At five years post surgery, 64% of 111 patients achieved an excellent or good score.

Analysis of the individual questions

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

Percentage scoring 0 or 1 for each question (n = 643) at six-months.

		%
1	Moderate or severe pain from the operated ankle	23
2	Only able to walk around the house or unable to walk before the pain becomes severe	6
3	Extreme difficulty or impossible to walk on uneven ground	15
4	Most of the time or always have to use an orthotic	22
5	Pain greatly or totally interferes with usual work	16
6	Limping most or every day	34
7	Extreme difficulty or impossible to climb a flight of stairs	7
8	Pain from your ankle in bed most or every nights	7
9	Pain from your ankle greatly or totally interferes with usual recreational activities	23
10	Have swelling of your foot most or all of the time	31
11	Very painful or unbearable to stand up from a chair after a meal	6
12	Sudden severe pain from your ankle most or every day	5

Revision ankle questionnaire responses

There were 32 revision ankle responses with 38% achieving an excellent or good score. This group includes all revision ankle responses. The mean revision ankle score was 29.06 (standard deviation 11.62, range 8 – 48).

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **twelve**-year report analyses data for the period January 2000 – December 2011. There were 4083 primary shoulder procedures registered, an additional 578 compared to last year's report and an increase of 17% over the 2010 registrations.

2000	**122**
2001	162
2002	193
2003	225
2004	280
2005	293
2006	366
2007	400
2008	457
2009	513
2010	494
2011	578

Of the 4083 shoulder registrations, 1350(33%) are hemi shoulder replacements, 1633(40%) are conventional total shoulder replacements, 894(22%) are reverse shoulder replacements, 151(3.7%) are partial resurfacing shoulder replacements and 55(0.3%) are total resurfacing replacements.

DATA ANALYSIS

Age and sex distribution
The average age for all patients with a shoulder arthroplasty was 70.49 years, with a range of 15.63 – 99.36 years.

All shoulder arthroplasty

	Female	Male
Number	2622	1461
Percentage	64.22	35.78
Mean age	72.09	67.61
Maximum age	97.71	99.36
Minimum age	15.63	21.83
Standard dev.	10.05	10.62

Hemiarthroplasty

	Female	Male
Number	906	444
Percentage	67.11	32.89
Mean age	71.58	66.06
Maximum age	97.71	99.36
Minimum age	15.63	25.83
Standard dev.	10.95	12.12

Conventional total shoulder arthroplasty

	Female	Male
Number	1058	575
Percentage	64.79	35.21
Mean age	71.06	67.44
Maximum age	94.62	85.72
Minimum age	26.64	29.38
Standard dev.	9.01	8.19

Reverse shoulder arthroplasty

	Female	Male
Number	575	319
Percentage	64.32	35.68
Mean age	76.30	73.92
Maximum age	91.67	88.25
Minimum age	40.70	49.41
Standard dev.	7.49	7.58

Partial Resurfacing arthroplasty

	Female	Male
Number	53	98
Percentage	35.10	64.90
Mean age	57.28	55.65
Maximum age	87.06	82.72
Minimum age	20.70	21.83
Standard dev.	15.74	11.73

Total resurfacing arthroplasty

	Female	Male
Number	30	25
Percentage	54.55	45.45
Mean age	69.26	65.45
Maximum age	85.71	80.55
Minimum age	53.18	45.16
Standard dev.	8.43	8.39

There is a female to male preponderance of almost 2:1 in all groups except partial resurfacing where the ratio is reversed. This group also has a significantly lower mean age at time of surgery.

Previous operation

None	3472
Rotator cuff repair	142
Internal fixation for juxtarticular fracture	100
Previous stabilisation	83
Arthroscopy/debridement	64
Acromioplasty	46
Subacromial decompression	7
Osteotomy	2
Other	33

Diagnosis

Osteoarthritis	2205
Cuff tear arthropathy	630
Acute fracture prox. humerus	433
Rheumatoid arthritis	389
Post old trauma	286
Avascular necrosis	129
Post recurrent dislocation	58
Other inflammatory	42
Tumour	17
Other	46

Approach

Deltopectoral	3623
Deltoid split	101
Other	13

Bone graft

Humeral autograft	81
Humeral allograft	16
Humeral synthetic	3
Glenoid autograft	29
Glenoid allograft	8

Cement

Humerus cemented	1223
Antibiotic in cement	727
Glenoid cemented	1132
Antibiotic in cement	769

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic

3823 (94%)

Operating theatre

Conventional	2561
Laminar flow	1476
Space suits	640

ASA Class

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

For the seven-year period 2005 – 2011 there were 2900 (94%) shoulder procedures with the ASA class recorded.

Definitions

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

ASA	Number	Percentage
1	283	10
2	1583	54
3	1004	35
4	30	1

Operative time (skin to skin in minutes)

	Mean	Min	Max	StDev
Hemi	108	30	360	37
Total Sh.	129	53	270	32
Partial R.	97	44	285	37
Total R.	134	84	220	29
Reverse	118	39	246	31

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the seven-year period 2005 – 2011.

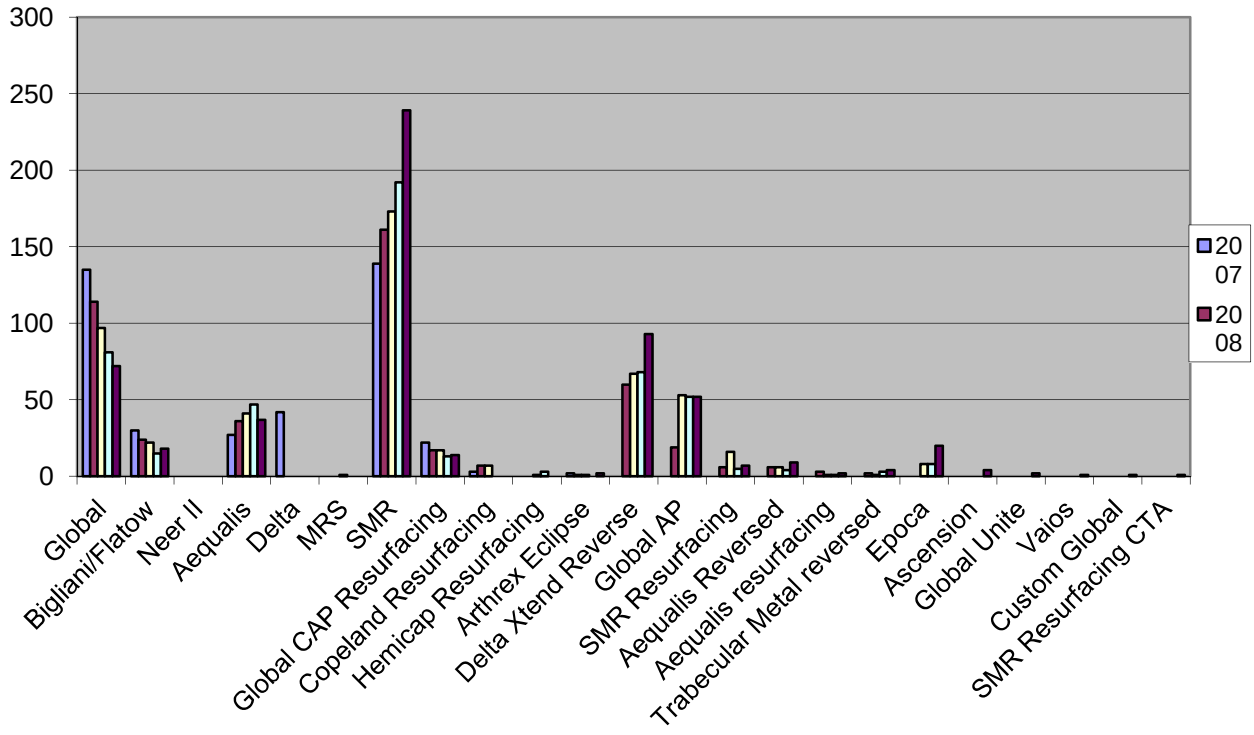
Consultant	2959
Advanced trainee supervised	143
Advanced trainee unsupervised	7
Basic trainee	1

Prosthesis usage

Shoulder prostheses used in 2011

SMR	239
Global	72
Delta Xtend Reverse	93
Global AP	52
Aequalis	37
Bigliani/Flatow	18
Global CAP Resurfacing	14
Epoca	20
SMR Resurfacing	7
Aequalis Reversed	9
Trabecular Metal Reverse	4
Ascension	4
Global Unite	2
Aequalis Resurfacing	2
Arthrex Eclipse	2
Vaios	1
Custom Global	1
SMR Resurfacing CTA	1

Most used shoulder prostheses 2007 -2011



Surgeon and hospital workload

Surgeons

In 2011, 73 surgeons performed 578 shoulder procedures, an average of 8 procedures per surgeon. 7 surgeons performed more than 20 procedures and 17 surgeons performed 1 procedure.

Hospitals

In 2011, shoulder replacement was performed in 47 hospitals. 25 were public and 22 were private.
For 2011 the average number of shoulder replacements per hospital was 12.

REVISION SHOULDER ARTHROPLASTY

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

Data analysis

For the twelve year period January 2000 – December 2011, there were 305 revision shoulder procedures registered.
The average age for a shoulder revision was 67.56 years with a range of 24.05 – 89.68 years.

	Female	Male
Number	172	133
Percentage	56.39	43.61
Mean	69.72	64.77
Maximum age	89.68	81.86
Minimum age	33.20	24.05
Standard dev.	11.53	10.82

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

This section analyses data for revisions of primary shoulder procedures for the twelve-year period.
There were 165 revisions of the primary group of 4083 (4.04%). There were 11 procedures that had been revised twice and 2 that had been revised 3 times.

Time to revision

Mean	739 days
Maximum	3473 days
Minimum	0 days
Standard deviation	755 days

Reason for revision

Pain	44
Dislocation/instability anterior	33
Loosening glenoid	20
Deep infection	14
Wear glenoid	17
Subacromial cuff impingement	21
Cuff failure	6
Instability posterior	5
Loosening humeral	6
Fracture humerus	2
Subacromial tuberosity impingement.	2
Other	23

Analysis by time for the 5 main reasons for revision

		Years since surgery											
		0	1	2	3	4	5	6	7	8	9	10	Total
1	Count	1	9	13	8	4	4	0	2	0	2	1	44
	%	2.30	20.50	29.50	18.20	9.10	9.10	0.00	4.50	0.00	4.50	2.30	100.00
2	Count	22	4	4	1	1	0	1	0	0	0	0	33
	%	66.70	12.10	12.10	3.00	3.00	0.00	3.00	0.00	0.00	0.00	0.00	100.00
3	Count	5	2	5	3	1	1	1	0	0	0	2	20
	%	25.00	10.00	25.00	15.00	5.00	5.00	5.00	0.00	0.00	0.00	10.00	100.00
4	Count	3	2	5	3	1	0	0	0	0	0	0	14
	%	21.40	14.30	35.70	21.40	7.10	0.00	0.00	0.00	0.00	0.00	0.00	100.00
5	Count	1	3	5	5	3	1	0	0	2	0	1	21
	%	4.80	14.30	23.80	23.80	14.30	4.80	0.00	0.00	9.50	0.00	4.80	100.00

1 = Pain, 2 = Dislocation, 3 = Loosening glenoid, 4 = Deep infection, 5 Subacromial cuff impingement

Statistical note

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

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

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

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

All Total Shoulder Arthroplasties

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
	4083	16377	165	1.01	0.86	1.17

Revision rate of Shoulder Prostheses vs Arthroplasty Type

Operation Type	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Total	1633	6566	47	0.72	0.53	0.95
Reverse	894	2461	29	1.18	0.79	1.69
Hemis	1350	6845	77	1.12	0.89	1.41
Total Resurfacing	55	80	0	0.00	0.00	4.59
Partial Resurfacing	151	424	12	2.83	1.46	4.94

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

Revision Rate of Individual Shoulder Prostheses Sorted on Alphabetical Order

	Prothesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Conventional	Aequalis	209	826	7	0.85	0.34	1.75
	Affinis	1	5	0	0.00	0.00	79.58
	Anatomical	35	296	0	0.00	0.00	1.57
	Arthrex Eclipse	1	1	0	0.00	0.00	709.14
	Bi-Angular	8	57	0	0.00	0.00	6.48
	Bigliani/Flatow	216	1247	3	0.24	0.05	0.70
	Cofield 2	21	177	0	0.00	0.00	2.08
	Epoca Humeral stem	4	6	0	0.00	0.00	65.63
	Global	431	1877	8	0.43	0.18	0.84
	Global AP	143	235	0	0.00	0.00	1.57

	Global Stem	1	3	0	0.00	0.00	141.38
	Osteonics	49	353	4	1.13	0.31	2.90
	Neer 3	2	20	0	0.00	0.00	18.26
	Neer II	12	113	0	0.00	0.00	3.26
	SMR	495	1325	25	1.89	1.22	2.78
	Univers 3D	5	26	0	0.00	0.00	14.10
Reverse	Aequalis Reversed	29	64	0	0.00	0.00	5.78
	Delta	55	327	1	0.31	0.01	1.70
	Delta Xtend Reverse	311	594	7	1.18	0.47	2.43
	SMR	489	1465	21	1.43	0.89	2.19
	Trabecular Metal Reverse	9	11	0	0.00	0.00	32.47
	Vaios	1	1	0	0.00	0.00	528.38
Hemi	Aequalis	108	517	6	1.16	0.43	2.53
	Aequalis Reversed	1	0	0	0.00	0.00	1247.56
	Arthrex Eclipse	2	6	0	0.00	0.00	59.51
	Bi-Angular	19	165	2	1.21	0.15	4.38
	Bigliani/Flatow	126	807	12	1.49	0.77	2.60
	Bio-modular	1	7	1	14.00	0.35	78.03
	Cofield 2	50	414	0	0.00	0.00	0.89
	Delta	1	5	0	0.00	0.00	69.92
	Delta Xtend Reverse	12	18	2	11.12	1.35	40.17
	Global	681	3437	35	1.02	0.71	1.42
	Global AP	33	55	1	1.84	0.05	10.23
	Global Unite	2	0	0	0.00	0.00	3454.78
	Osteonics	43	312	1	0.32	0.01	1.79
	Anatomical	19	167	0	0.00	0.00	3.05
	MRS Humeral	4	12	0	0.00	0.00	30.89
	Neer II	24	175	0	0.00	0.00	2.10
	Randelli	1	8	0	0.00	0.00	44.82
	SMR	220	733	17	2.32	1.35	3.71
	SMR Resurfacing	1	1	0	0.00	0.00	502.75
	Trabecular Metal Reverse	1	2	0	0.00	0.00	165.32
	Univers 3D	1	4	0	0.00	0.00	96.59
Total Resurfacing	Aequalis Resurfacing Head	6	12.1	0	0.00	0.00	30.61
	Epoca Head	24	22.0	0	0.00	0.00	16.80
	Global CAP Resurfacing	23	45.0	0	0.00	0.00	8.19
	SMR Resurfacing	2	1.3	0	0.00	0.00	279.54
Partial Resurfacing	Aequalis Resurfacing Head	1	0.8	0	0.00	0.00	453.66
	Ascension	4	0.8	0	0.00	0.00	482.93
	Copeland Resurfacing	19	59.4	2	3.37	0.41	12.17
	Custom Global Cap	1	0.4	0	0.00	0.00	898.24

	Eclipse	3	4.9	2	40.56	4.91	146.52
	Epoca Head	8	8.0	1	12.48	0.00	69.55
	Global CAP Resurfacing	76	262.1	4	1.53	0.42	3.91
	Hemicap Resurfacing	6	16.9	0	0.00	0.00	21.80
	SMR Resurfacing	27	58.0	1	1.72	0.04	9.61
	SMR Resurfacing CTA	6	12.9	2	15.49	1.88	55.94

The SMR has a significantly higher revision rate for the conventional, hemi and partial resurfacing versions. The Delta Xtend Reverse has a significantly higher revision rate for the hemi version.

Revision vs Glenoid Fixation

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	1100	5092.58	24	0.47	0.30	0.70
Uncemented	531	1472.56	23	1.56	0.99	2.34

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

SMR Glenoid Alert

There are concerns re the high revision rate for the L2 glenoid and it is recommended by Lima that it no longer be implanted. The L1 glenoid is still available.

Glenoid	No Ops	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
L1 Glenoid	191	9	1.1	0.5	1.5
L2 Glenoid	245	10	5.3	3.1	8.5

In the L1 group with 3-8 years followup 8 of the 9 revisions were within the first 2.5 years.

In the L2 group with 0-3 years followup there is a range in time to revision from 155 days to 2.4 years at this time.

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	296	1312	26	1.98	1.29	2.90
55_64	782	3200	47	1.47	1.08	1.95
65_74	1481	6072	56	0.92	0.70	1.20
GE75	1524	5794	36	0.62	0.44	0.86

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

Revision vs Gender

Gender	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Female	2622	10715	94	0.88	0.71	1.07
Male	1461	5662	71	1.25	0.98	1.58

There is no significant difference between the two groups.

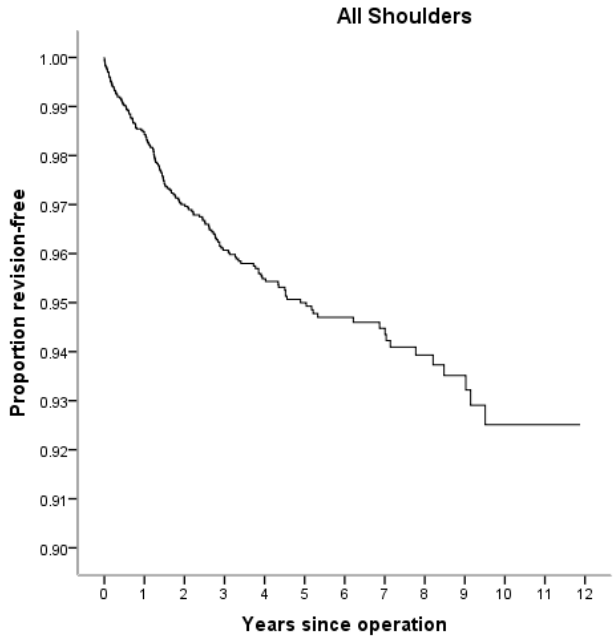
Revision vs Surgeon Annual Workload

Consultant Number of ops/yr	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
<10	2108	8625	96	1.11	0.90	1.36
>=10	1975	7752	69	0.89	0.69	1.13

There is no significant difference between the two groups.

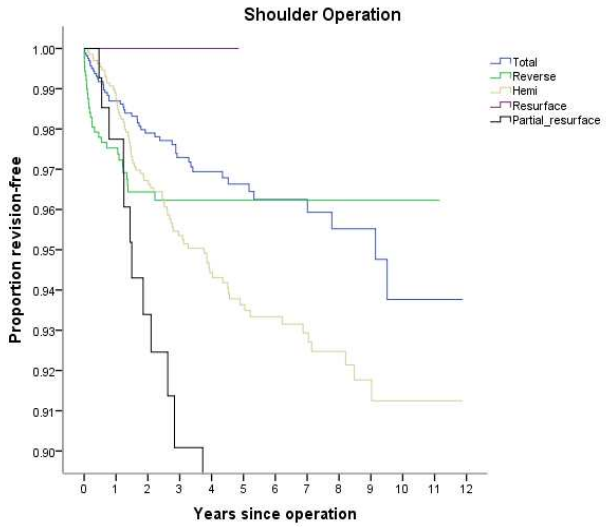
KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the years 2000 – 2011 with deceased patients censored at time of death.



Years	% Revision-free	N
1	98.16	3400
2	96.85	2821
3	95.98	2248
4	95.42	1767
5	94.85	1352
6	94.69	1000
7	94.08	751
8	93.92	511

There are insufficient numbers to give an accurate revision free % beyond 8 years.



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

Quesionnaires at six months post surgery

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

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

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

We have grouped the questionnaire responses based on the scoring system as published by Kalairajah et al, in 2005. (see appendix 1)
This groups each score into four categories;

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

For the twelve-year period and as at August 2012, there were 2,761 shoulder questionnaire responses registered at six months post surgery.
The mean shoulder score was 36.14 (standard deviation 9.69, range 2 – 48)

Scoring	> 41	1011
Scoring	34 - 41	852
Scoring	27 - 33	431
Scoring	<27	467

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

6 month Oxford Scores for the different arthroplasty types

Operation types	No of patients	Mean Score	Std. Error	Lower Bound	Upper Bound
Conventional Total	1188	39.82	0.231	39.36	40.27
Reverse	610	35.06	0.391	34.29	35.82
Hemi	841	31.62	0.345	30.94	32.3
Total Resurfacing	44	40.48	0.813	38.84	42.12
Partial Resurfacing	78	34.99	1.034	32.93	37.05
Total	2761	36.14	0.184	35.78	36.5

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

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

This dataset represents sequential Oxford shoulder scores for 644 individual patients.

At five years post surgery, 75% of these patients achieved an excellent or good score and had a mean of 38.84.

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

Percentage scoring 0 or 1 for each question out of the group of 2,761 at six-months and 644 at five-years.

		%	%
1	The worst pain from the shoulder is severe or unbearable	17	12
2	Usually have moderate or severe pain from the operated shoulder	21	12
3	Extreme difficulty or impossible to get in and out of a car or public transport	3	2
4	Extreme difficulty or impossible to use a knife and fork at the same time	5	2
5	Extreme difficulty or impossible to do the household shopping on your own	7	6
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	8	6
7	Extreme difficulty or impossible to brush or comb hair with the operated arm	18	12
8	Extreme difficulty or impossible to dress yourself because of your operated shoulder	7	3
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	16	12
10	Extreme difficulty or impossible to wash and dry under both arms	9	5
11	Pain from operated shoulder greatly or totally interfering with usual work	13	11
12	Pain from shoulder in bed most or every nights	15	10

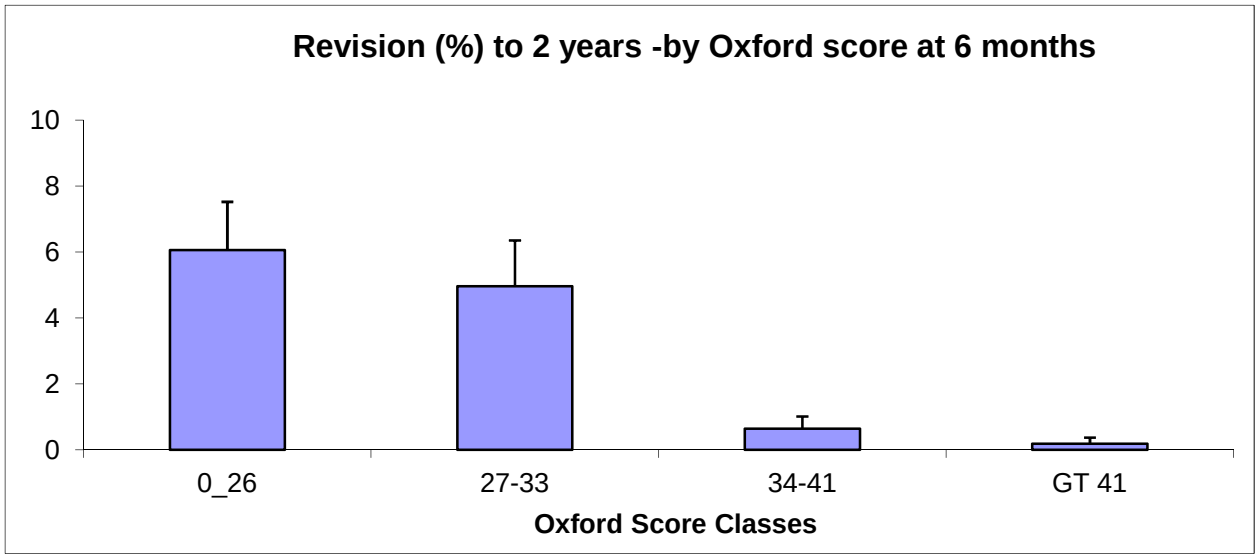
Revision shoulder questionnaire responses
There were 171 revision shoulder responses with 49% achieving an excellent or good score. This group includes all revision shoulder responses. The mean revision shoulder score was 31.59(standard deviation 10.30, range 3 – 48).

OXFORD 12 SCORE AS A PREDICTOR OF SHOULDER ARTHROPLASTY REVISION

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

Six month score and revision arthroplasty

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

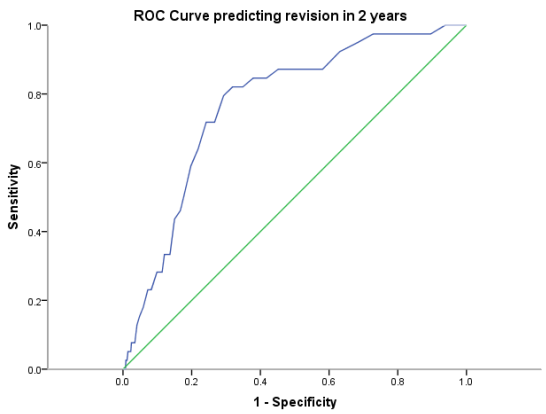


Revision risk versus Kalairajah groupings of Oxford scores within two years of the 6 month score date

Kalairajah group	No in group	No. revised	%	Std error
0-26	319	18	5.64	1.29
27-33	287	14	4.88	1.27
34-41	566	4	0.71	0.35
GT 41	667	3	0.45	0.26

A person with an oxford score >42 has a 0.45 % risk of revision within two years compared to a 5.64% risk with a score of 27 or less

A ROC analysis has demonstrated that a patient with a score less than or equal to 33 has 9 times the risk of needing a revision within 2 years compared to a person with a score greater than 33.



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

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The **twelve**-year report analyses data for the period January 2000 – December 2011. There were 364 primary elbow procedures registered, an additional 33 compared to last year's report.

2000	**18**
2001	29
2002	32
2003	23
2004	28
2005	30
2006	31
2007	36
2008	40
2009	34
2010	30
2011	33

DATA ANALYSIS

Age and sex distribution
The average age for an elbow replacement was 65.87 years, with range of 15.16 – 92.23 years.

	Female	Male
Number	289	75
Percentage	79.40	20.60
Mean age	66.29	64.26
Maximum age	92.23	91.73
Minimum age	36.38	15.16
Standard dev.	11.83	14.11

Previous operation

None	310
Internal fixation for juxtarticular fracture	14
Synovectomy+-removal radial head	11
Debridement	9
Nerve transposition/ Decompression	5
Osteotomy	2
Ligament reconstruction	1
Interposition arthroplasty	1
Other	5

Diagnosis

Rheumatoid arthritis	207
Post fracture	96
Osteoarthritis	44
Other inflammatory	8
Tumour	6
Post dislocation	5
Post ligament disruption	4
Other	5

Approach

Posterior	228
Medial	76
Lateral	26

Bone graft

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

Cement

Humerus cemented	340	
Antibiotic in cement	241	(71%)
Ulna cemented	324	
Antibiotic in cement	224	(69%)
Radius cemented	20	
Antibiotic in cement	19	(95%)

Systemic antibiotic prophylaxis
Patient number receiving at least one systemic antibiotic

340	(93%)

Operating theatre

Conventional	255
Laminar flow	106
Space suits	50

ASA Class
This was introduced with the updated forms at the beginning of 2005.
For the seven-year period 2005 – 2011, there were 213 (91%) primary elbow procedures with the ASA class recorded.

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

ASA	Number
1	7
2	95
3	107
4	4

Operative time (skin to skin)

Mean	137 minutes
Maximum	255 minutes
Minimum	29 minutes
Standard dev	35 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the seven- year period 2005 – 2011.

Consultant	231
Advanced trainee supervised	4
Advanced trainee unsupervised	2

Surgeon and hospital workload

In 2011, 17 surgeons performed 33 primary elbow procedures.

Hospitals

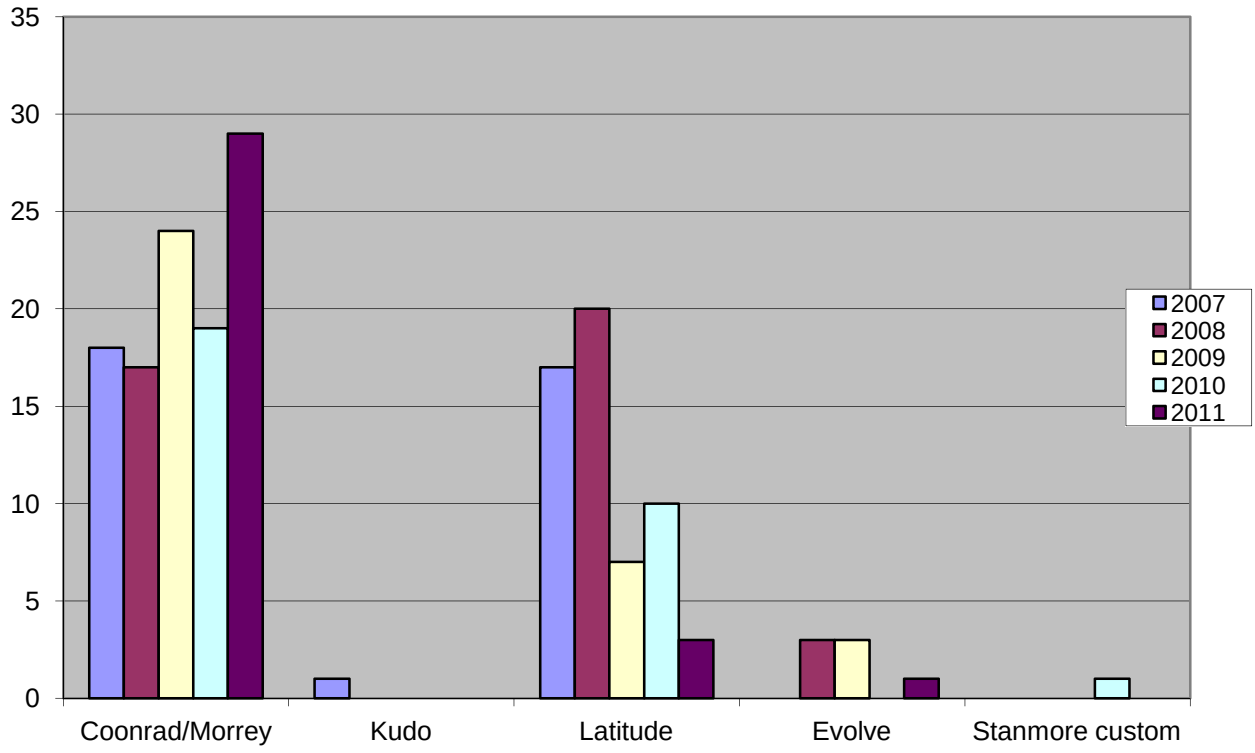
In 2011, primary elbow replacement was performed in 15 hospitals. 11 were public and 4 were private.

Prosthesis usage

Elbow prostheses used in 2011

Coonrad/Morrey	**29**
Latitude	3
Evolve	1

MOST USED ELBOW PROSTHESES 2007 – 2011



REVISION ELBOW ARTHROPLASTY

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

Data analysis

For the twelve-year period January 2000 – December 2011, there were 64 revision elbow procedures registered. This is an additional 8 compared to last year's report.

The average age for a revision elbow replacement was 65.04 years, with a range of 30.97 – 88.95 years.

	Female	Male
Number	45	19
Percentage	70.31	29.69
Mean	64.84	65.54
Maximum age	88.95	84.17
Minimum age	42.23	30.97
Standard dev.	9.45	12.56

Revision of registered primary elbow arthroplasties

This section analyses data for revisions of primary elbow procedures for the twelve-year period January 2000 – December 2011.

There were 21 revisions of the primary group of 364 (5.8%).
There were 3 that had been revised twice and 1 that had been revised 3 times.

Time to revision

Mean	941 days
Maximum	3163 days
Minimum	62 days
Standard deviation	727 days

Reason for revision

Loosening humeral component	6
Loosening ulnar component	4
Deep infection	6
Pain	3
Loosening radial head component	1
Fracture humerus	1
Fracture ulna	1
Other	3

Analysis by time for the 3 main reasons for revision

		Years since operation											
		0	1	2	3	4	5	6	7	8	9	10	Total
1	Count	0	0	2	2	2	0	0	0	0	0	0	6
	%	0.00	0.00	33.30	33.30	33.30	0.00	0.00	0.00	0.00	0.00	0.00	100.00
2	Count	0	0	0	3	1	0	0	0	0	0	0	4
	%	0.00	0.00	0.00	74.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
3	Count	0	0	3	1	0	0	0	1	0	1	0	6
	%	0.00	0.00	50.00	16.70	0.00	0.00	0.00	16.70	0.00	16.70	0.00	100.00

1 = Loosening humeral component, 2 = Loosening ulnar component, 3 = Deep infection

Statistical note

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

Observed component years

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

Rate/100 component years

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

Statistical Significance

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

All Primary Total Elbow Replacements

	No. Ops	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
	364	1706	21	1.23	0.76	1.88

Revision Rate of Individual Prostheses Sorted in Alphabetic Order

Prosthesis	No. Ops	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Acclaim	16	95	4	4.19	1.14	10.74
Coonrad/Morrey	258	1276	9	0.71	0.32	1.34
Custom device	1	11	0	0.00	0.00	33.00
Evolve Stem	7	18	0	0.00	0.00	20.16
Kudo	18	112	2	1.79	0.22	6.45
Latitude	62	186	6	3.22	1.18	7.01
Sorbie Questor	1	6	0	0.00	0.00	59.91
Stanmore custom implant	1	1	0	0.00	0.00	257.62

Revision vs Gender

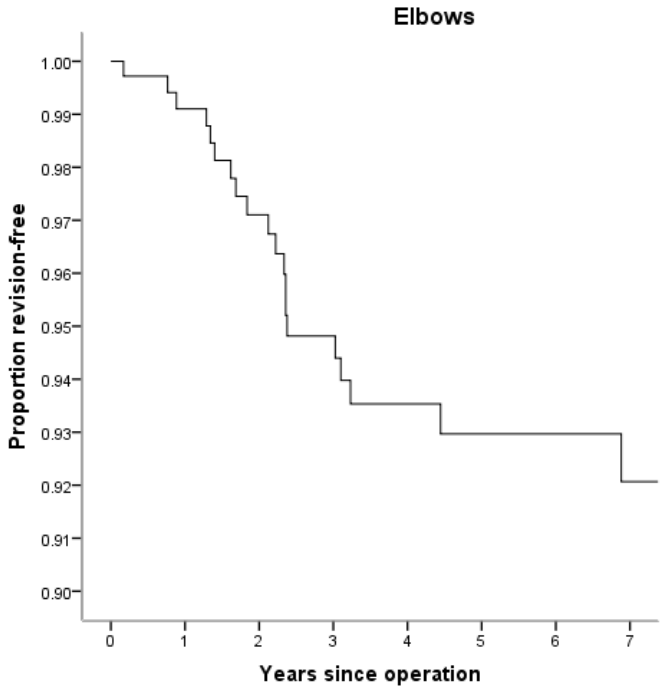
Gender	No. Ops	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Females	289	1414	13	0.92	0.49	1.57
Males	75	292	8	2.74	1.18	5.41

Revision vs Age Bands

Age Bands	No. Ops	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	69	361	3	0.83	0.17	2.43
55_64	99	503	8	1.59	0.69	3.14
65_74	104	441	8	1.81	0.78	3.57
GE75	92	401	2	0.50	0.06	1.80

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses for the years 2000 to 2010 with deceased patients censored at time of death.



Years	% Revision-free	N
1	99.10	320
2	97.10	279
3	94.80	244

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

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTHS POST SURGERY

Questionnaires at six months post surgery

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

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

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

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

This groups each score into four categories;

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

For the twelve-year period and as at August 2012, there were 260 primary elbow responses registered at six months post surgery.
The mean primary elbow score was 37.03 (standard deviation 9.79, range 7 – 48)

Scoring > 41	**116**
Scoring 34 - 41	65
Scoring 27 - 33	35
Scoring < 27	44

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

Questionnaires at five-years post surgery

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

At five years post surgery, 89% of 47 achieved an excellent or good score.

Analysis of the individual questions

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

Percentage scoring 0 or 1 for each question at six months out of 260 responses.

		%
1	The worst pain from the shoulder is severe or unbearable	11
2	Extreme difficulty or impossible to dress yourself because of your operated elbow	6
3	Extreme difficulty or impossible to lift a teacup safely with your operated arm	6
4	Extreme difficulty or impossible to get your hand to your mouth	4
5	Extreme difficulty or impossible to carry the household shopping with your operated arm	18
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	13
7	Extreme difficulty or impossible to brush or comb hair with the affected arm	14
8	Usually have moderate or severe pain from the operated elbow	13
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	9
10	Extreme difficulty or impossible to wash and dry under both arms	10
11	Pain from operated elbow greatly or totally interfering with usual work or hobbies	13
12	Pain from elbow in bed most or every nights	7

Revision elbow questionnaire responses

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

LUMBAR DISC REPLACEMENT

PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the ten-year period January 2002 – December 2011. There were 140 primary lumbar disc replacements registered to 10 surgeons.

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

Data analysis

The average age for a lumbar disc replacement was 40.30 years, with a range of 25.22 – 62.19 years.

	Female	Male
Number	67	73
Percentage	47.86	52.14
Mean age	40.45	40.16
Maximum age	62.19	60.71
Minimum age	25.22	27.19
Standard dev.	8.58	7.44

Disc replacement levels

L3/4	19
L4/5	98
L5/S1	31

Fusion levels

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

Previous operation

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

Diagnosis

Degenerative disc disease	
L3/4	11
L4/5	58
L5/S1	78
Other	3
Annular tear MRI scan	
L3/4	13
L4/5	66
L5/S1	26
Other	1
Discogenic pain on discography	
L3/4	19
L4/5	83
L5/S1	63
Other	1

Approach

Retroperitoneal midline	129
Retroperitoneal lateral	2
Transperitoneal	2
Other- mini open horizontal	1

Intraoperative complications

Damage to major veins	12
Subsidence	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	113

Operating theatre

Conventional	81
Laminar flow	59
Spacesuits	2

Operative time (skin to skin)

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

Surgeon grade

Consultant	140

REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

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

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

There were 2 revisions of the primary group of 140 lumbar disc replacements (1.4%) and 1 re-revision.

Time to revision

Mean	457 days
Maximum	672 days
Minimum	242 days

Reason for revision

Pain	2
Loss of spinal alignment	1

Oswestry Disability Index

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

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

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

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

CERVICAL DISC REPLACEMENT

This report analyses data for the eight-year period January 2004 – December 2011. There were 168 primary cervical disc replacements registered to 15 surgeons.

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

Data analysis

The average age for a cervical disc replacement was 44.10 years, with a range of 24.92 – 65.76 years.

	Female	Male
Number	74	94
Percentage	44.05	55.95
Mean age	44.99	43.39
Maximum age	65.76	58.89
Minimum age	27.73	24.92
Standard dev.	7.57	6.91

Disc replacement levels

C3/4	8
C4/5	14
C5/6	93
C6/7	76
C7T1	0
Other	1

Previous operation

Foraminotomy	6
Adjacent level fusion	14
Adjacent level disc arthroplasty	1
Discectomy	3
Other	1

Diagnosis

Acute disc prolapse	130
Chronic spondylosis	9
Neck pain	4
Degenerative disc disease	14
Myelopathy	3
Other	1

Approach

Anterior right	118
Anterior left	14
Smith Robinson	1

Intra operative complications

Equipment failure	1
Removal of implant	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	118

Operating theatre

Laminar flow	86
Conventional	81
Spacesuits	1

Operative time (skin to skin)

Mean	129 minutes
Standard deviation	57 minutes
Minimum	36 minutes
Maximum	302 minutes

Surgeon grade

Consultant	168

Revision Cervical disc replacement

There was 1 revision cervical disc replacement registered.

There were no revisions of the 168 primary cervical disc replacements.

Neck Disability Index Scoring

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

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

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

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

If one section is missed (or not applicable) the score is calculated:
Example: 16 (total scored)/45(total possible score) x 100 = 35.5%
0 is the best score and 100 is the worst score.

Pre operative score

Neck Disability Index	n = 76
Mean	48.32
Maximum	92
Minimum	2
Standard deviation	19.70

Post operative score

Neck Disability Index	n = 83
Mean	24.44
Maximum	72
Minimum	0
Standard deviation	19.56

Appendix I

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

Questionnaire on the perceptions of patients about shoulder surgery
Jill Dawson, Ray Fitzpatrick, Andrew Carr. J Bone Joint Surg B. 1996 July;78(4) 593-600

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

Appendix II

Publications in Peer Reviewed Journals

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

2 The early failure of the Oxford Phase 3 unicompartmental arthroplasty - an audit of revisions. The New Zealand experience. Hartnett NI, Tregonning RJA, Rothwell A, Hobbs T**.** J Bone Joint
Surg Br, Orthopaedic Proceedings 2006;88 B Supp II:318

3 A New Zealand national joint registry review of 202 total ankle replacements followed for up to 6 years
Hosman AH, Mason RB, Hobbs T, Rothwell AG.
Acta Orthop. 2007 Oct; 78(5):584-91

4 Functional outcomes of femoral peri prosthetic fracture and revision hip arthroplasty: a matched pair study from the New Zealand Registry.
Young SW, Walker CG, Pitto RP.
Acta Orthop. 2008 Aug: 79(4); 483-8

5 Bilateral total joint arthroplasty : the early results from the New Zealand National Joint Registry
Hooper GJ, Hopper NM, Rothwell AG, Hobbs T.
J Arthroplasty. 2008 Dec 2. (Pub Med)

6 Revision following cemented and uncemented primary total hip replacement: a seven year analysis from the New Zealand Joint Registry
Hooper GJ, Rothwell AG, Stringer M, Frampton C.
J Bone Joint Surg Br. 2009 Apr;91(4):451-8

7 An analysis of the Oxford hip and knee scores and their relationship to early joint revision
Data from the New Zealand Joint Registry
Rothwell AG, Hooper GJ, Hobbs A, Frampton C.
J Bone Joint Surg Br.2010 Mar;92(3)413-418

8 The survivorship and functional outcomes of unicompartmental knee replacements converted to total knee replacements: The New Zealand National Joint Registry
Andrew J Pearse, Gary J Hooper, Alastair G Rothwell, Chris Frampton.
J Bone Joint Surg Br. 2010 Apr;92(4):508-12

9 Does the use of Laminar Flow and Space Suits Reduce Early Deep Infection in Total Hip and Knee Replacement? The ten year results of the New Zealand Joint Registry
G J Hooper, AG Rothwell, M Wyatt, C Frampton
J bone Joint Surg Br.2011 Jan;93(1): 85-90

10 Use of Patient-Reported Outcomes in the context of Different Levels of Data
Rolfson, A Rothwell, K Chenok, E Bohm, K Bozic, G Garellick
J Bone Joint Surg Am 2011;93 Suppl 3(E):66-71

11 A Multinational Assessment of Metal in Metal bearings in Hip Replacement
S Graves, A Rothwell, K Tucker, J Jacobs, A Sedrakyan
J Bone Joint Surg Am 2011;93 Suppl 3(E):43-7

12 Does the ASA physical rating score predict early complications or poorer outcomes following hip or knee arthroplasty Analyses from the New Zealand Joint Registry.
Hooper G J, Rothwell A G, Hooper N, Frampton C
J Bone Joint Surg Am. 2012 Jun 20;94(12):1065-70.

13 Osteotomy and Unicompartmental Knee Arthroplasty Converted to Total Knee Arthroplasty: Data From the New Zealand Joint Registry.Pearse AJ, Hooper GJ, Rothwell AG, Frampton C. J Arthroplasty. 2012 Oct 11

14 A review of national shoulder and elbow joint replacement registries. Rasmussen JV, Olsen BS, Fevang BT, Furnes O, Skytta ET, Rahme H, Salomonsson B, Mohammed KD, Page RS, Carr AJ. J Shoulder Elbow Surg. 2012 Oct;21(10):1328-35.

Accepted for publication

15 Are the outcomes following total hip replacement compromised by supervision of surgeons in training? Inglis TEW, Dalzell K, Hooper GJ, Rothwell AG, Frampton C.

Appendix III

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

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

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

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

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

ANKLES		
DEPUY	Agility	
	Mobility	
Orthotec	Ramses	
REM Systems	Salto	
Link	Star	

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

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

Date: .....

Patient Name:

Address:

Consultant: .....

BMI:.....

[If different from patient label]

Side:..... **

Hospital: .....

Town/City

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

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

FEMUR

Please do not fold

ACETABULUM

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

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

BONE GRAFT - ACETABULUM

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

FEMORAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

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

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

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

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

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Hip Joint

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Patient Name:

Address:

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

Tick Appropriate Boxes

REASON FOR REVISION

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

Date Index Operation: .....

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

REVISION

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

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

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

FEMUR

Please do not fold

bar-coded label

ACETABULUM

Please do not fold

bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

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

BONE GRAFT - ACETABULUM

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

FEMORAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

❑ **Adv Trainee Supervised**

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Knee
Free Phone 0800-274-989 ❑ Total Knee Arthroplasty ❑ Unicompartmental ❑ Patellofemoral
31.05.2010

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

Patient Name:

Address:

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

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

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

FEMUR

Please do not fold

TIBIA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - TIBIA

❑ Allograft
❑ Autograft ❑ Synthetic

PATELLA

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

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

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

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Knee Joint

Free Phone 0800-274-989

07.04.2005

Date: .....

Side:..... **

Patient Name:

Address:

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

Hospital: .....

Town/City:.....

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

❑ Medial parapatellar ❑ Lateral parapatellar ❑ Other

FEMUR

Please do not fold

TIBIA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT – FEMUR

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT – TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

PATELLA

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Shoulder
0800-274-989 ❑ **Total shoulder Arthroplasty** ❑ **Hemiarthroplasty** ❑ **Reverse Shoulder**
06.05.2009

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

Patient Name:

Address:

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

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

❑ **None**
❑ **Internal fixation for juxtarticular fracture**
❑ **Previous stabilisation**
❑ **Osteotomy**
❑ **Arthrodesis**
❑ **Other: Name:** .....

DIAGNOSIS

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

APPROACH

❑ **Deltopectoral** ❑ **Other : specify**

HUMERUS

Please do not fold

GLENOID

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

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

BONE GRAFT - GLENOID

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

HUMERAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK ALL LABELS ON REVERSE SIDE

CEMENT

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Shoulder

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Tick Appropriate Boxes

Patient Name:

Address:

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

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ Deltopectoral ❑ Other: specify

HUMERUS

Please do not fold

GLENOID

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑Allograft ❑ Synthetic
❑Autograft

BONE GRAFT - GLENOID

❑Allograft ❑ Synthetic
❑Autograft

HUMERAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Ankle

Free Phone 0800-274-989
31.05.2010

Date: .....

BMI:.....

Side:..... **

Patient Name:

Address:

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

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

.....

APPROACH

❑ Anterior ❑ Anterio-lateral ❑ Other

TIBIA

Please do not fold

TALUS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT - TALUS

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

AUGMENTS

Please do not fold

FUSION DISTAL TFJ

STICK ALL LABELS ON REVERSE SIDE

CEMENT

❑Tibia ❑ Talus ❑ Antibiotic Brand:
.....

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Ankle Joint

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

Date: .....

Side:..... **

Patient Name:

Address:

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

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ **Anterior** ❑ **Anterio-lateral** ❑ **Posterior**

TIBIA

Please do not fold

TALUS

Please do not fold

STICK ALL LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

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

BONE GRAFT - TALUS

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

AUGUMENTS

Please do not fold

FUSION DISTAL TFJ

Yes ❑ No ❑

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Elbow

Free Phone 0800-274-989
07.04.2005

Date: .....

Patient Name:

Address:

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

Side:..... **

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold

ULNA

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

BONE GRAFT - ULNA

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

RADIAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Elbow Joint

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

Date: .....

Patient Name:

Address:

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

Side:..... **

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

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

HU

Please do not fold

UL

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

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

BONE GRAFT - ULNA

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

RADIAL HEAD

Please do not fold

AUGMENTS

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Cervical Disc Replacement

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

Date: .....

Patient Name:

Address:

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

Tick Appropriate Boxes

ACC ☐ **ACC Claim No: .....**

LEVELS OF DISC REPLACEMENT

.....

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

PRE OP PATIENT SCORE (NECK DISABILITY INDEX)

PREVIOUS OPERATION

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

DIAGNOSIS

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

APPROACH

- ❑ **Anterior Right**
- ❑ **Anterior Left**
- ❑ **Other**

.....

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

.....

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

- ❑ **Yes**
- ❑ **No**

OPERATIVE THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Revision Cervical Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:

Address:

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

LEVEL OF REVISION

.....

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

Tick Appropriate Boxes

Town/City: .....

ACC ☐ **ACC Claim No:** .....

REASON FOR REVISION

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

Date Index Operation: .....

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

REVISION

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

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

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

Osteotomy

IMPLANTS

Please do not fold

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

Please do not fold

Please do not fold

STICK EXTRA LABELS ON REVERSE SIDE

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

Name .....

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Primary Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:

Address:

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

Town/City.....

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

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

FUSION Levels
❑ L3/4
❑ L4/5
❑ L5/S1

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

Oswestry Score
Percentage score

Other .....

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

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

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

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS
.....

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

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

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Revision Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:

Address:

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

Tick Appropriate Boxes

ACC ☐ ACC Claim No: .....

REASON FOR REVISION

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

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

REVISION

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

APPROACH

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

NEW DISC REPLACEMENT Levels

- ❑ **L3/4**
- ❑ **L4/5**
- ❑ **L5/S1**

NEW FUSION Levels

- ❑ **L3/4**
- ❑ **L4/5**
- ❑ **L5/S1**

PRE OP PATIENT SCORE

Modified Roland and Morris

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

Oswestry Score

Percentage score

Other .....

IMPLANTS

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

Affix Supplier Label

Affix Supplier Label

STICK EXTRA LABELS ON REVERSE SIDE

INTRAOPERATIVE COMPLICATIONS

.....

.....

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

Yes ❑ **No ❑**

OPERATIVE THEATRE

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

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

PRIMARY OPERATING SURGEON

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

TOTAL HIP REPLACEMENT - QUESTIONNAIRE

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

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

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

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

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

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

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

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

6 Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

7 How much has pain from your operated on hip interfered with your usual work (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

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

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

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

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

Additional Information

Have you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	□	□	.
The joint became infected?	□	□.....	

or for any other reason related to the artificial joint:.....

.....

Hospital admitted to: .....

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

REVISION HIP REPLACEMENT - QUESTIONNAIRE

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

Patient Address: ..... **Operating Surgeon:**.....

..... **Date of Surgery:**.....

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

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

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

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

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

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

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

6 Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

7 How much has pain from your operated on hip interfered with your usual work (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

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

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

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

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

Additional Information

Have you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	□	□	
The joint became infected?	□	□	.....

or for any other reason related to the artificial joint.....

.....

.....

Hospital admitted to:.....

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

TOTAL KNEE REPLACEMENT - QUESTIONNAIRE

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

Patient Address: ..... **Operating Surgeon:**.....

..... **Date of Surgery:** .....

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

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

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

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

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

4 Could you kneel down and get up again afterwards on your operated knee?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

6 Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

7 How much has pain from your operated on knee interfered with your usual work (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

9 Have you felt that your operated on knee might suddenly "give way" or let you down?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

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

11 Could you walk down one flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

Additional Information

Have you at any time been hospitalised because:

Yes No Approx Date

The artificial joint dislocated? □

□.....

The joint became infected? □ .

or for any other reason related to the artificial joint:

.....

.....

Hospital admitted to:

.....

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

REVISION KNEE REPLACEMENT - QUESTIONNAIRE

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

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

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

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

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

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

4 Could you kneel down and get up again afterwards?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

6 Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?
- 4 No trouble at all
- 3 Very little trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

7 How much has pain from your operated on knee interfered with your usual work (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

9 Have you felt that your operated on knee might suddenly "give way" or let you down?
- 4 Rarely/never
- 3 Sometimes, or just at first
- 2 Often, not just at first
- 1 Most of the time
- 0 All of the time

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

11 Could you walk down one flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

Additional Information

Have you at any time been hospitalised because:

Yes No Approx Date

The artificial joint dislocated? □

The joint became infected? □

or for any other reason related to the artificial joint: .....

.....

.....

Hospital admitted to:.....

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

TOTAL ANKLE REPLACEMENT - QUESTIONNAIRE

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

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

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

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

2 For how long have you been able to walk before the pain from your operated on ankle becomes severe?
- 4 No pain up to 30 minutes
- 3 16 to 30 minutes
- 2 5 to 15 minutes
- 1 Around the house only
- 0 Unable to walk at all because of severe pain

3 Have you been able to walk on uneven ground?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 Extreme difficulty
- 0 No impossible

4 Have you had to use an orthotic (shoe insert), heel lift, or special shoes?
- 4 Never
- 3 Occasionally
- 2 Often
- 1 Most of the time
- 0 Always

5 How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

6 Have you been limping when walking because of your operated on ankle?
- 4 No days
- 3 Only one or two days
- 2 Some days
- 1 Most days
- 0 Every day

7 Have you been able to climb a flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 Impossible

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

9 How much has pain from your operated on ankle interfered with your usual recreational activities?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

10 Have you had swelling of your foot?
- 4 None at all
- 3 Occasionally
- 2 Often
- 1 Most of the time
- 0 All the time

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

12 Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
- 4 No days
- 3 Only 1 or 2 days
- 2 Some days
- 1 Most days
- 0 Every day

Additional Information

Have you at any time been hospitalised because:

Yes No Approx Date

The artificial joint dislocated? □ .....

The joint became infected? □ .....

or for any other reason related to the artificial joint:.....

.....

....

Hospital admitted to.....

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

REVISION ANKLE REPLACEMENT - QUESTIONNAIRE

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

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

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

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

2 For how long have you been able to walk before the pain from your operated on ankle becomes severe?
- 4 No pain up to 30 minutes
- 3 16 to 30 minutes
- 2 5 to 15 minutes
- 1 Around the house only
- 0 Unable to walk at all because of severe pain.

3 Have you been able to walk on uneven ground?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 Extreme difficulty
- 0 No impossible.

4 Have you had to use an orthotic (shoe insert), heel lift, or special shoes?
- 4 Never
- 3 Occasionally
- 2 Often
- 1 Most of the time
- 0 Always

5 How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

6 Have you been limping when walking because of your operated on ankle?
- 4 No days
- 3 Only one or two days
- 2 Some days
- 1 Most days
- 0 Every day

7 Have you been able to climb a flight of stairs?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 Impossible

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

9 How much has pain from your operated on ankle interfered with your usual recreational activities?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

12 Have you had swelling of your foot?
- 4 None at all
- 3 Occasionally
- 2 Often
- 1 Most of the time
- 0 All the time

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

12 Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
- 4 No days
- 3 Only 1 or 2 days
- 2 Some days
- 1 Most days
- 0 Every day

Additional Information

Have you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	□	□	.....
The joint became infected?	□	□	.....

or for any other reason related to the artificial joint:.....

Hospital admitted to: .....

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

TOTAL SHOULDER REPLACEMENT - QUESTIONNAIRE

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

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

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

1 How would you describe the ***worst*** pain you have had from your operated on shoulder?
- 4 None
- 3 Mild
- 2 Moderate
- 1 Severe
- 0 Unbearable

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

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

4 Have you been able to use a knife and fork at the same time?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

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

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

8 Have you had any trouble dressing yourself because of your operated on shoulder?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

9 Could you hang your clothes up in a wardrobe – using the operated on arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

11 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

Additional Information

Have you at any time been hospitalised because:

Yes No Approx Date

The artificial joint dislocated? □ .....

The joint became infected? □ .....

or for any other reason related to the artificial joint:.....

.....

Hospital admitted to:
.....

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

REVISION SHOULDER REPLACEMENT - QUESTIONNAIRE

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

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

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

1 How would you describe the ***worst*** pain you have had from your operated on shoulder?
- 4 None
- 3 Mild
- 2 Moderate
- 1 Severe
- 0 Unbearable

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

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

4 Have you been able to use a knife and fork at the same time?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

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

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

8 Have you had any trouble dressing yourself because of your operated on shoulder?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

9 Could you hang your clothes up in a wardrobe – using the operated on arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

11 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

Additional Information

Have you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	□	□	.....
The joint became infected?	□	□	.....

or for any other reason related to the artificial joint:.....
.....
.....

Hospital admitted to:
.....

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

TOTAL ELBOW REPLACEMENT - QUESTIONNAIRE

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

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

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

1 How would you describe the ***worst*** pain you have had from your operated on elbow?
- 4 None
- 3 Mild
- 2 Moderate
- 1 Severe
- 0 Unbearable

2 Have you had any trouble dressing yourself because of your operated on elbow?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

3 Can you lift a teacup safely with your operated on arm?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Have you been able to get your hand to your mouth?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

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

7 Could you brush/comb your hair with the affected arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, Impossible

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

9 Could you hang your clothes up in a wardrobe – using the operated on arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

15 How much has pain from your operated on elbow interfered with your usual work hobbies or recreational activities (including hobbies and housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

Additional Information

Have you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	□		.....
The joint became infected?	□		.....

or for any other reason related to the artificial joint:

Hospital admitted to:
.....

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

REVISION ELBOW REPLACEMENT - QUESTIONNAIRE

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

Patient Address: ..... **Operating Surgeon:** .....

..... **Date of Surgery:**.....

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

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

1 How would you describe the ***worst*** pain you have had from your operated on elbow?
- 4 None
- 3 Mild
- 2 Moderate
- 1 Severe
- 0 Unbearable

2 Have you had any trouble dressing yourself because of your operated on elbow?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

3 Can you lift a teacup safely with your operated on arm?
- 4 No trouble at all
- 3 A little bit of trouble
- 2 Moderate trouble
- 1 Extreme difficulty
- 0 Impossible to do

4 Have you been able to get your hand to your mouth?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

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

7 Could you brush/comb your hair with the affected arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, Impossible

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

9 Could you hang your clothes up in a wardrobe – using the operated on arm?
- 4 Yes, easily
- 3 With little difficulty
- 2 With moderate difficulty
- 1 With extreme difficulty
- 0 No, impossible

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

17 How much has pain from your operated on elbow interfered with your usual work hobbies or recreational activities (including hobbies and housework)?
- 4 Not at all
- 3 A little bit
- 2 Moderately
- 1 Greatly
- 0 Totally

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

Additional Information

Have you at any time been hospitalised because:

	Yes	No	Approx Date
The artificial joint dislocated?	□		.....
The joint became infected?	□		.....

or for any other reason related to the artificial joint:.....

.....

Hospital admitted to:.....

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