NEW ZEALAND ORTHOPAEDIC ASSOCIATION

THE NEW ZEALAND JOINT REGISTRY

ELEVEN YEAR REPORT

JANUARY 1999 TO DECEMBER 2009

REGISTRY BOARD

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Date of Publication:
October 2010

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EDITORIAL COMMENT

It is our pleasure to present the eleven year report of the New Zealand Orthopaedic Associations New Zealand Joint Registry

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The total number of registered joint arthroplasties at 31.12.2009 was 132510 which had been performed on 99104 individual patients of which 11409 (11.5%) died during the 11 year period. The number of observed component years contained within the Registry has now reached well over 500,000 years. The increase of 15885 registered joints for 2009 compared to the 15311 in 2008 represents a overall annual gain of 3.7% which is significant when compared to the 0.38% increase for 2008.There were increased registrations for all arthroplasty categories when compared to 2008 registrations, except for elbows which fell by 15%.The biggest increase was 16% for unicompartmental knees which reversed the trend of the previous two years. 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 now approximately 63000 hip arthroplasties in the registry with an overall revision rate of 0.66 per 100 observed component-years (ocys) with a 10-year prosthesis survival of 93.1%. The annual percentage of uncemented hip arthroplasties continues to rise and in 2009 reached almost 52%. This rise is at the expense of fully cemented hips which last year fell to 14% of total compared to 56% in 1999. Hybrid arthroplasty remains relatively static at 34%. 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. However, the KM curves for the 3 types of arthroplasty continue to converge and at ten years prosthesis survival is 93.19%, 93.51% and 92.94% respectively for cemented, uncemented and hybrid hips. If this trend continues uncemented hips may demonstrate lower revision rates over the next 5-10 years.

There are 787 hip prosthesis combinations in the Registry; 493 (63%) have fewer than 10 registered procedures and 259 (33%) one only. This substantial increase in the number of combinations compared to last year is because some combinations that were previously grouped together have now been further defined eg CLS/RM has now had the RM pressfit split off into a separate group.
Revision rates for individual hip component combinations as well as for individual components for which there are a minimum of 250 primary procedures have been calculated. The Corail/Pinnacle, Twinsys uncem /Selexys, Spectron/ Duraloc and Elite plus/Duraloc have revision rates significantly higher ($p<0.05$) than the overall rate of 0.66/100 ocys. The first two combinations were among the top ten for 2009 and should therefore be flagged. Ten of the 32 Corail/ Pinnacle revisions had had the primary procedure at the same hospital and when these are deleted the revision rate is no longer significant. The ASR cup is one component with a significantly higher revision rate that has also been noted in other Registries and has now been withdrawn from the market . However, the New Zealand revision rate is not as high as has been reported by others.

Overall the hip revision rate noted above and the ten year prosthesis survival of 93.10% are among the best for similar joint registries around the world. A similar situation applies to knee prostheses with the overall revision rate 0.53/100 ocys, (95% confidence interval; 0.50, 0.56) and the ten year survival of 95.63% again among the best for international Joint Registries. New Zealand surgeons can therefore be justifiably proud of these medium term trends.

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 and acetabular type. For head sizes =< 28mm the ceramic on ceramic articulation had a significantly higher revision rate and for head sizes >28mm the metal on metal articulation had a significantly higher revision rate. Overall the metal on plastic articulation has a significantly lower revision rate than the other combinations.

There are 83 different knee prostheses registered within the registry and analyses of the 28 that have a minimum of 50 primary registered procedures were undertaken. The 2 LCS uncemented and the Scorpio prostheses have

significantly higher revision rates ($p<0.05$) than the overall rate of 0.53/100 ocys. The LCS Complete is the only one of these 3 prostheses that was implanted (346) in 2009.

Although uncemented knee arthroplasty represents just 4.5% 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 in contrast to the hips the uncemented curve continues to diverge from the other two and at ten years survival is 93.07% compared to 95.72% for cemented and 95.93% for hybrid.

Image guidance (IG), first recorded by the registry in 2005, continues to be increasingly used for primary knee arthroplasty and during 2009 was used in 14% of procedures. Comparison of revision rates for IG with non IG procedures demonstrates a rate of 0.68 versus 0.53/100 ocys. There is no statistical difference between the two at this early stage.

There are 121 patello-femoral prostheses registered with 23 added in 2009. Nine (7.4%) have been revised.

With regard to unicompartmental knee arthroplasty the main feature for 2009 was the doubling of the number of implanted uncemented Oxford prostheses which also topped the prosthesis usage list. The minimally invasive approach for the uni-compartmental knee arthroplasty remains popular and in 2009 was again used in 37% of procedures. Despite the oxinium uni being reported as having a very high revision rate in previous reports 3 further ones were implanted during 2009. Nine out of 33 have been revised.

Once again we have compared the deep infection revision rates within six months of the primary procedure for primary hip and knee arthroplasty against 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 compared to a conventional theatre. The use of space suits also significantly increases the risk of revision for deep infection in both conventional and laminar flow theatres. As noted in last year's editorial an in depth investigation of these findings was being undertaken and a paper has been accepted for publication in the British Journal of Bone and Joint Surgery.

The number of primary ankle arthroplasties increased by 119 in 2009 which was 12 greater than the previous year. The KM survival curve demonstrates a rather steep descent for years 4-6.

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. Although there is considerable variation in revision rates for the different prostheses there are no statistically significant differences either within or across the groups owing to very wide confidence intervals for several prostheses as a consequence of relatively few operations but the reverse group as a whole does have a significantly higher revision rate ($p<0.05$) than the 4 other groups. Conventional total arthroplasty has a significantly better mean Oxford score than the other groups.

Oxford 12 Questionnaire

For the first time 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 and knees including unicompartmental, has again been demonstrated. Furthermore the 5 year score and revision within 2 years of that date demonstrates an even more significant relationship especially for knee arthroplasty.
In terms of using the Oxford scores as a screening tool for arthroplasty follow up it is worth noting that 70% of hip, 67% of knee and 71% of unicompartmental revisions within 2 years would have been captured by monitoring the lowest 30%, 30% and 16% respectively of the Oxford scores. From the 5 year data, 67% of hip and 81% of knee

revisions would have been captured by monitoring the lowest 30% and 26% respectively of the Oxford scores

Publications and Presentations

Since last year's report 2 further peer reviewed papers based on registry data have been published in the British Journal of Bone and Joint surgery and a further one accepted for publication. In addition there were 6 Registry based podium presentations at the Combined Orthopaedic Associations meeting in Glasgow.

Alastair Rothwell	Toni Hobbs	Chris Frampton
Supervisor	Coordinator	Statistician

ACKNOWLEDGEMENTS

The Registry is very appreciative of the support from the following

Canterbury District Health Board:
for the website and other facilities

New Zealand Health Information Service :
For audit compliance information

Mike Wall, Alumni Software:
For continued monitoring and upgrading of data base software

FUNDING

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

ACCIDENT COMPENSATION CORPORATION

CANTERBURY DISTRICT HEALTH BOARD

MINISTRY OF HEALTH

NEW ZEALAND ORTHOPAEDIC ASSOCIATION

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

Auckland Hospital
Auckland 1142
Contact: Shelley Thomas

Christchurch Hospital
Christchurch 8140
Contact: Barbara Clark

Gisborne Hospital
Gisborne 4010
Contact: Jackie Dearman

Hawkes Bay Hospital
Hastings 4120
Contact: Michaela Zemmerich

Kenepuru Hospital
Porirua 5240
Contact: Sue von Hartitzsch

Masterton Hospital
Masterton 5840
Contact: Sarah Duckett

Nelson Hospital
Nelson 7040
Contact: Pauline Manley or Anne Fryer

Palmerston North Hospital
Palmerston North 4442
Contact: Karen Langvad-Forster

Southland Hospital
Invercargill 9812
Contact: Helen Powley

Tauranga Hospital
Tauranga 3143
Contact: Sue Clynes

Waikato Hospital
Hamilton 3204
Contact: Maria Ashurst or Helen Keen

Wanganui Hospital
Wanganui
Contact: Sue Slight

Waitakere Hospital
Henderson, Auckland 0612
Contact: Alannah Domigan

Burwood Hospital
Christchurch 8083
Contact: Diane Darley

Dunedin Hospital
Dunedin 9016
Contact: Jenni Taylor

Grey Base Hospital
Greymouth 7840
Contact: Anna Vorverk or Marg Wafer

Hutt Hospital
Lower Hutt 5040
Contact: Sonja Dowle or Gavin Rodgers

Manukau Surgery Centre
Auckland 2104
Contact: Amanda Ellis

Middlemore Hospital
Auckland 1640
Contact: Francine Gabriel

Northshore Hospital,
Waitemata DHB
Takapuna 0740
Contact: Chris Cavalier

Rotorua Hospital (Lakes DHB)
Rotorua 3046
Contact: Janice Reynolds

Taranaki Base Hospital
New Plymouth 4342
Contact: Allison Tijsen

Timaru Hospital
Timaru 7940
Contact: Carol Campbell

Wairau Hospital
Blenheim 7240
Contact: Monette Johnston

Wellington Hospital
Newtown 6242
Contact: Rebecca Kay

Whakatane Hospital
Whakatane 3158
Contact: Karen Burke

Whangarei Area Hospital
Whangarei 0140
Contact: Helen Harris

Private Hospitals

Aorangi Hospital
Palmerston North 4410
Contact: Frances Clark

Ascot Integrated Hospital
Remuera 1050
Contact: Elizabeth Hollier

Belverdale Hospital
Wanganui 4500
Contact: Jane Young

Bidwill Trust Hospital
Timaru 7910
Contact: Kay Taylor

Boulcott Hospital
Lower Hutt 5040
Contact: Karen Hall

Bowen Hospital
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Contact: Pam Kohnke

Braemar Private Hospital
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Chelsea Hospital
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Contact: Jenny Long

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Kensington Hospital
Whangarei 0112
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PROFILE OF THE AVERAGE NEW ZEALAND ORTHOPAEDIC SURGEON *

From our analyses the average orthopaedic surgeon performed in 2009:

- 36 Total hip arthroplasties — with 52% using uncemented, 14% fully cemented and 34% hybrid prostheses: has a 93.10% survival at 10 years and a revision rate of 0.66 per 100 component years; 0.39% have been revised for deep infection; 85% at 6 months, 89% at five years and 86% at 10years had an excellent or good Oxford score.
- 31Total knee arthroplasties — with almost all cemented but only 10 with patellae resurfaced; has a 95.63% survival at 10 years and a revision rate of 0.53 per 100 component years; 0.58% have been revised for deep infection; 72% at 6 months, 82% at 5 years and 77% at ten years had an excellent or good Oxford score.
- 8 Unicompartmental knee arthroplasties — with most cemented; has a 89.90% survival at 8years and a revision rate of 1.43 per 100 component years; 0.28 % have been revised for deep infection; 80% at six months and 87% at 5 years had an excellent or good Oxford score.
- 8 Shoulder arthroplasties — with a 60:40 split between total and hemi; has a 95.47 % survival at 5 years and a revision rate of 0.94 per 100 component years; 0.3% have been revised for deep infection; 66% had an excellent or good Oxford score at 6 months.
- 8 Total ankle arthroplasties — mostly uncemented; 88.13% survival at 7years and a revision rate of 1.32 per 100 component years; 0.3 % revised for deep infection; 56% had excellent or good Oxford derived scores at 6 months.
- 1.6 Total elbow arthroplasties — most likely a cemented Coonrad-Morrey prosthesis; 93.73% survival at 4 years and a revision rate of 1.10 per 100 component years; 1% have been revised for deep infection; 68% had excellent or good Oxford derived scores at 6 months.

*** averages derived from the number of surgeons recorded performing the above procedures during 2009 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 NZOA to adopt a proposal by the then President, Alastair Rothwell to set up a National Joint Registry.

New Zealand surgeons have 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 Registers 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 and are meant 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 is 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.

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 having to obtain patient consent has created some difficulties with compliance.

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.

DEVELOPMENTS 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 adapted but not validated 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 2009 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 2008 Registry staff are Alastair Rothwell, Supervisor, Toni Hobbs, Coordinator, Pat Manning Secretary, Lynley Diggs, Anne McHugh and Jane Tope-Cobb 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; OILA Representative; Arthritis New Zealand Representative; Chief Executive 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 Registry Association.

NUMBER OF JOINTS ANALYSED
1ST JANUARY 1999 – 31ST DECEMBER 2009

Numbers of procedures registered

	11 years	10 years	9 years	8 years	7 Years	6 Years	5 Years
Hips, primary	63681	56383	49374	42421	35998	29680	23457
Hips, revision	9445	8405	7360	6383	5487	4570	3641
Knees, primary	46093	40068	34458	28705	23565	18537	14371
Knees, revision	3727	3293	2883	2499	2149	1736	1419
Knees, unicompartmental	5452	4826	4284	3709	3122	2565	1926
Shoulders, primary	3013	2498	2044	1641	1275	982	693
Shoulders, revision	213	180	139	105	80	57	45
Elbows, primary	301	267	227	191	160	130	101
Elbows, revision	49	41	36	31	26	20	15
Ankles, primary	603	484	377	298	216	146	99
Ankles, revision	38	29	26	19	12	8	6
Lumbar Disc, primary	111	94	75	59	38	22	
Cervical Disc, primary	95	57	31				
Lumbar disc , revision	3						
Cervical disc, revision	1						
TOTAL	**132510**	**116625**	**101314**	**86061**	**72128**	**58,453**	**45,776**

BILATERAL JOINT REPLACEMENTS CARRIED OUT UNDER THE SAME ANAESTHETIC

Bilateral hips	1323 patients	(2646 hips)	4.0%	of primary hips
Bilateral knees	2016 patients	(4032 knees)	9.0 %	of primary knees
Bilateral Unicompartmental knees	444patients	(888knees)	16.0%	of primary uni knees
Bilateral ankles	2 patients	(4 ankles)		
Bilateral shoulders	3 patients	(6 shoulders)		

The percentages have remained essentially unchanged from the previous reports.

During the 11 year period 99104 individual patients were registered of 11.5%. have died.

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

HIP ARTHROPLASTY

PRIMARY HIP ARTHROPLASTY

The eleven-year report analyses data for the period January 1999 – December 2009. There were 63,679 primary hip procedures registered including 912 resurfacing arthroplasties. This is an additional 7,305 compared to last year's report.

1999	4113
2000	4716
2001	4932
2002	4830
2003	5059
2004	6028
2005	6317
2006	6426
2007	6954
2008	7000
2009	7304

There was a 4.3% increase in hip registrations for 2009, which is an improvement on the 0.4% for 2008.

DATA ANALYSIS

Age and sex distribution

The average age for all patients with primary hip arthroplasty was 66.83 years, with a range of 15.43 – 100.13 years.

All hip arthroplasty

	Female	Male
Number	33473	30206
Percentage	52.57	47.43
Mean age	68.36	65.16
Maximum age	100.13	96.97
Minimum age	15.43	15.87
Standard dev.	11.72	11.51

Conventional hip arthroplasty

	Female	Male
Number	33257	29510
Percentage	52.98	47.02
Mean age	68.48	65.45
Maximum age	100.13	96.97
Minimum age	15.43	15.87
Standard dev.	11.65	11.40

Resurfacing hip arthroplasty

	Female	Male
Number	216	696
Percentage	23.68	76.32
Mean age	49.50	52.25
Maximum age	65.88	75.69
Minimum age	25.72	20.55
Standard dev.	7.20	8.52

A further 204 resurfacing hips were registered during 2009, 13 more than for 2008.

2004	21
2005	139
2006	169
2007	188
2008	191
2009	204

Previous operation

None	60593
Internal fixation	1385
Osteotomy	405
Internal fixation for SUFE	125
Arthroscopy/arthrotomy	70
Arthrodesis	58
Core decompression	44
Open reduction	40
Girdlestone	19
Other	113

Diagnosis

Osteoarthritis	54898
Acute fracture NOF	2287
Avascular necrosis	2026
Developmental dysplasia	1708
Rheumatoid arthritis	1002
Old fracture NOF	842
Other inflammatory	610
Tumour	299
Post acute dislocation	222
Fracture acetabulum	131
Other	187

Approach

Posterior	39557
Lateral	18136
Anterior	3121
Minimally invasive	1172
Trochanteric osteotomy	133
Image guided surgery	77

Image guided surgery was added to the updated forms at the beginning of 2005, but there continues to be

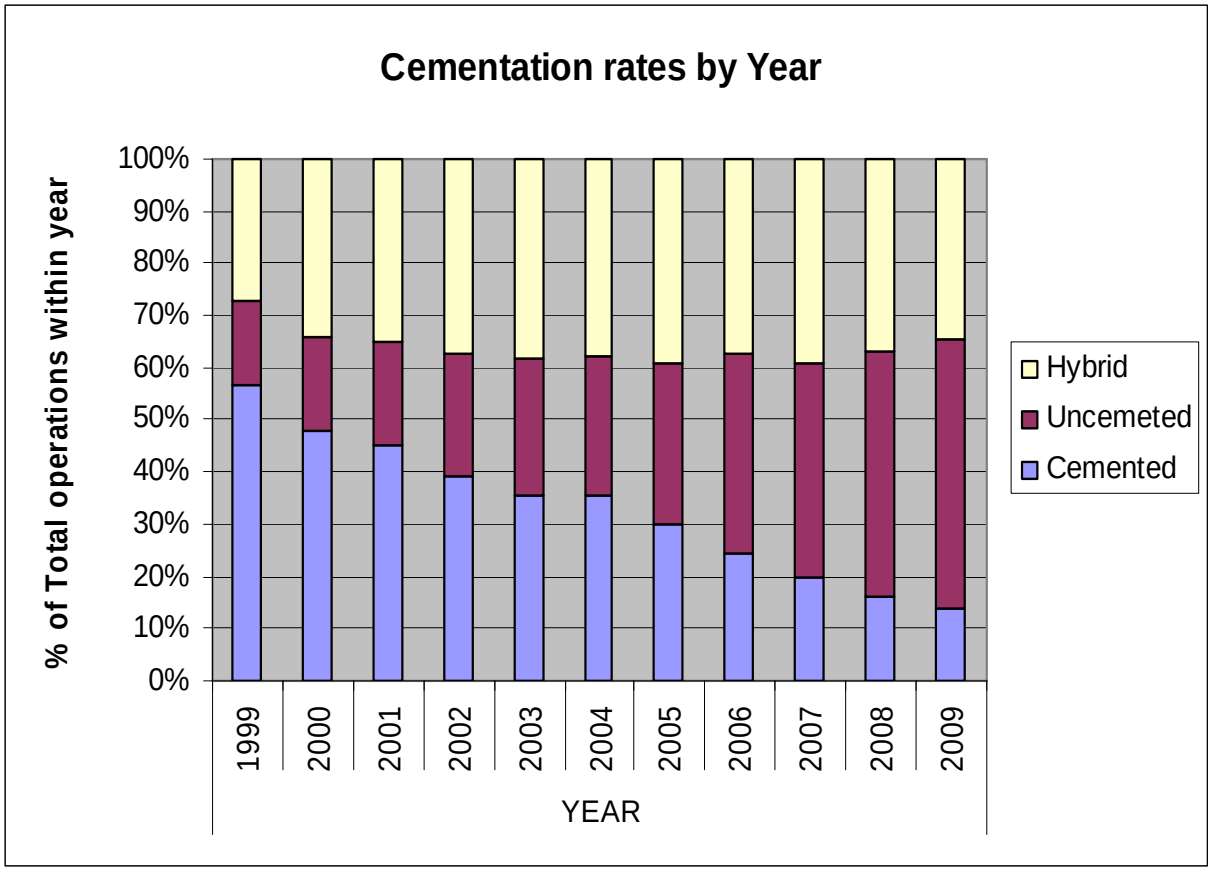
little interest in the technique. The minimally invasive approach has also waned after a surge in 2008

Bone graft

Femoral autograft	162
Femoral allograft	33
Femoral synthetic	3
Acetabular autograft	508
Acetabular allograft	79
Acetabular synthetic	3

Cement

Femur cemented	42496	(67%)
Antibiotic in cement	24419	(57%)
Acetabulum cemented	19979	(31%)
Antibiotic in cement	11348	(57%)



The proportion of uncemented hips is now over 50% of total with corresponding reductions to cemented and hybrid hips.

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 60951 (96%)

A cephalosporin was used in 86% of patients.

Operating theatre

Conventional	40162
Laminar flow	22434
Space suits	16077

In 2009, 49% of hip arthroplasties were performed in laminar flow theatres and space suits were used for 42%; the same percentages as for 2008.

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 five-year period 2005 – 2009, there were 30,526 (90%) primary hip procedures with the ASA class recorded.

ASA	Number	Percentage
1	5496	18
2	17885	59
3	6899	22
4	246	1

Operative time – skin to skin

Mean	80 minutes
Standard deviation	28 minutes
Minimum	24 minutes
Maximum	459 minutes

Surgeon grade
The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the five-year period 2005 – 2009.

Consultant	29433
Advanced trainee supervised	2630
Advanced trainee unsupervised	898
Basic trainee	875

Prosthesis usage

Resurfacing hips used in 2009

BHR	182
BMHR	7
ASR	5
Conserve	4
Mitch	4
Adept	2

The BHR is totally dominant at 89%. The ASR continues its steady decline.

Conventional primary hips

Top 10 femoral components used in 2009

Exeter V40	1957
TwinSys uncemented	1029
Corail	952
CLS	491
Spectron	366
Accolade	215
TwinSys cemented	214
Summit	213
Synergy porous	205
MS 30	188

The Twinsys uncemented and Corail continue their upward surge. The Exeter holds steady and the Twinsys cemented and Synergy porous enter the top 10 at the expense of Muller and CPT.

Top 10 acetabular components used in 2009

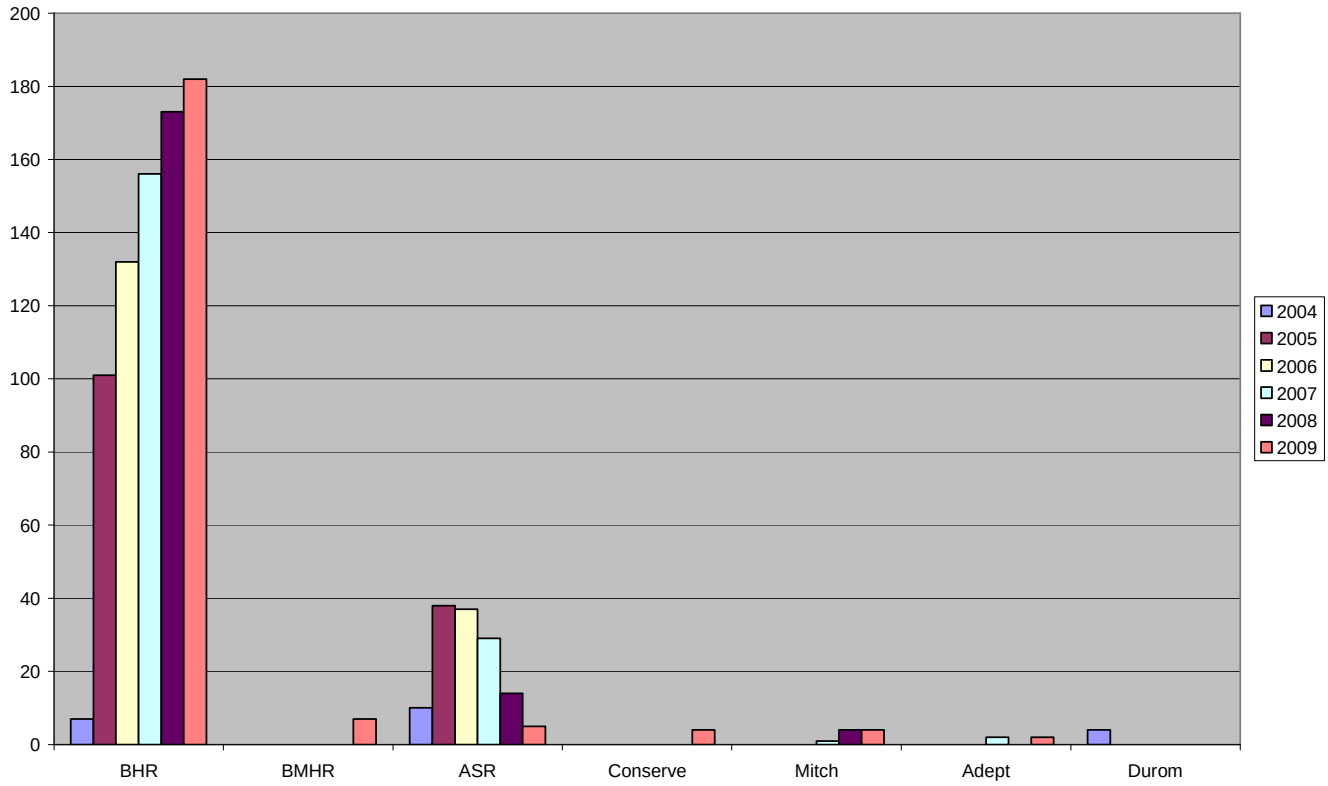
Pinnacle	1454
RM cup	996
Trident	773
Trilogy	589
Reflection porous	543
Contemporary	421
Fitmore	295
Selexys TPS	259
Trabecular metal	226
CCB	176

Pinnacle and RM remain on the top with increasing popularity. The Trabecular metal appears in the top 10 at the expense of Duraloc.

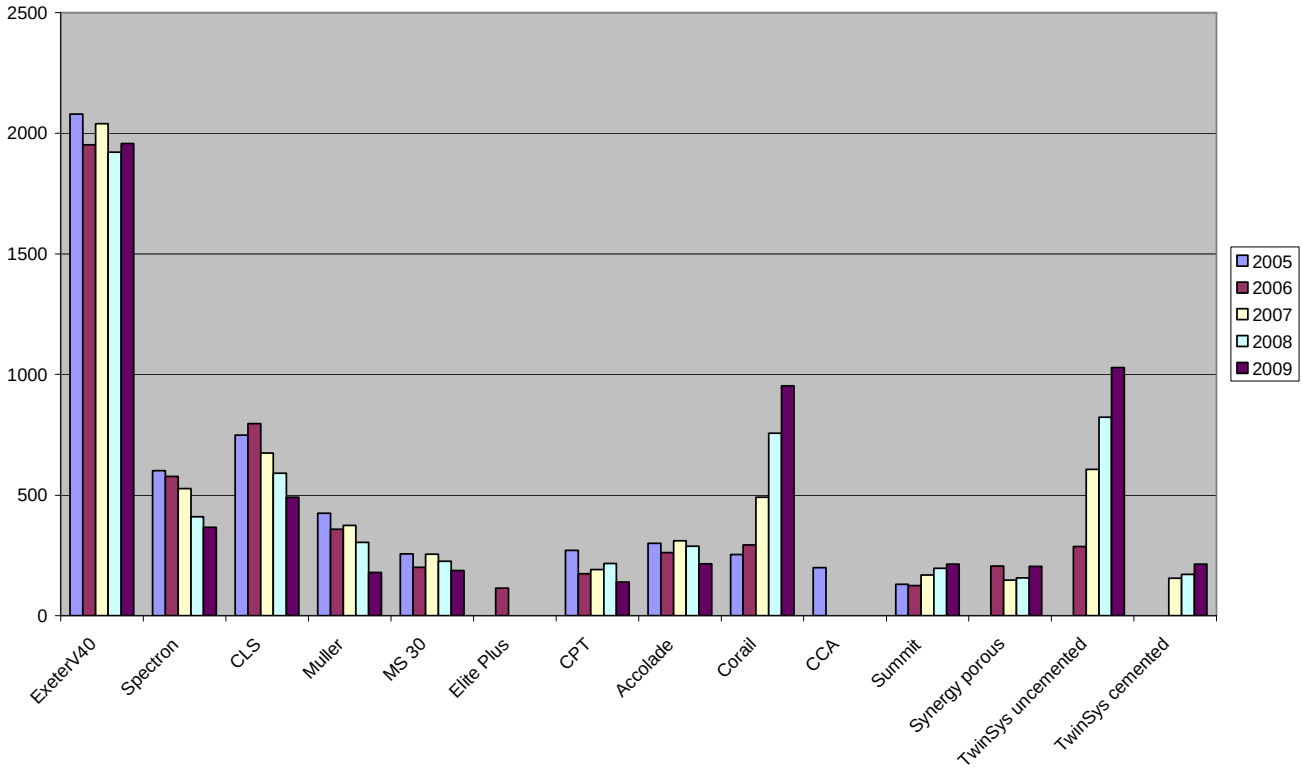
Top Ten Combinations used in 2009

Femur Prosthesis	Acetabular_Prosthesis	No. Ops.
Corail	Pinnacle	814
Exeter V40	Trident	616
Exeter V40	Contemporary	407
Spectron	Reflection porous	273
Twinsys uncemented	Selexys TPS	248
Twinsys uncemented	RM pressfit	213
Summit	Pinnacle	187
Exeter V40	Pinnacle	172
CLS	Fitmore	140
Exeter V40	RM pressfit	129

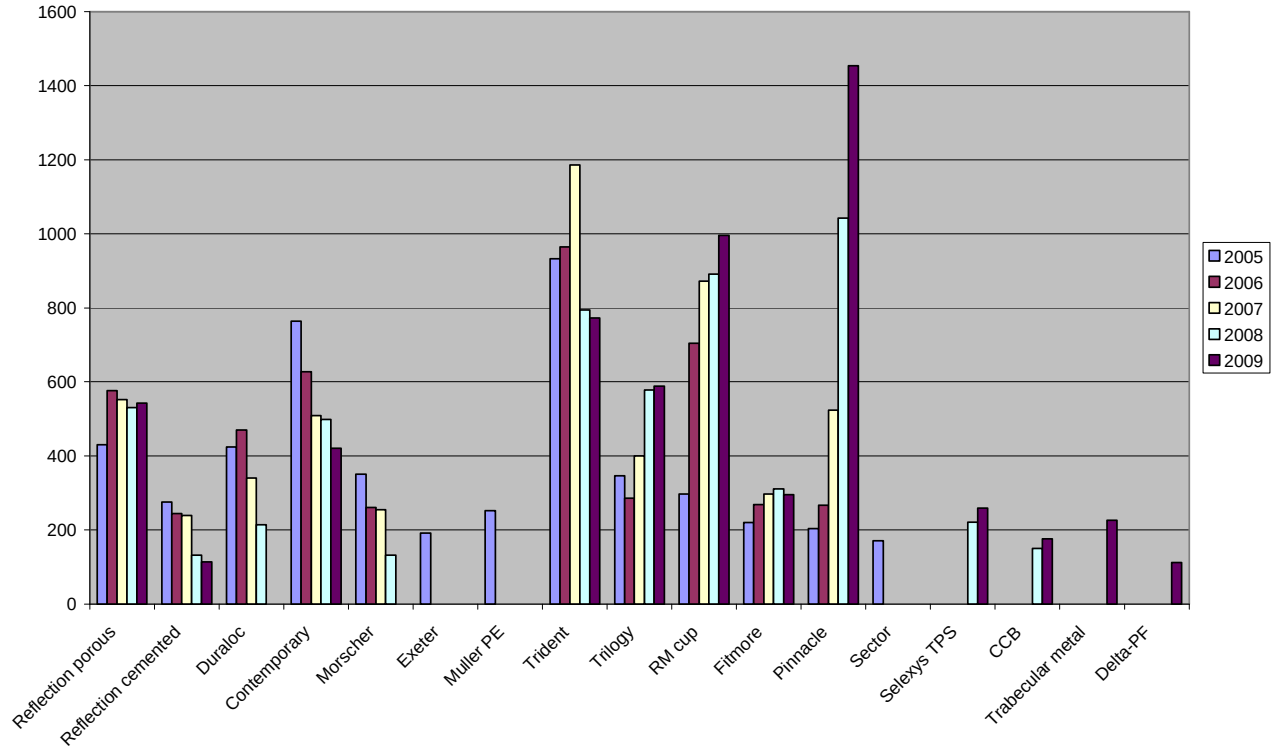
Most used Resurfacing Components 2004-2009



Most used femoral components 5 years 2005- 2009



Most used acetabular components 5 years 2005 -2009



Surgeon and hospital workload

Surgeons
In 2009, 196 surgeons performed 7,304 total hip replacements, an average of 36 procedures per surgeon.

37 surgeons performed less than 10 procedures and 51 performed more than 50.

Hospitals
In 2009, primary hip replacement was performed in 51 hospitals, 26 public and 25 private.

The average number of total hip replacements per hospital was 138.

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 eleven-year period January 1999 – December 2009, there were 9,444 revision hip procedures registered. This is an additional 1,033 compared to last year's report.

The average age for a revision hip replacement was 69.86 years, with a range of 17.52 – 97.72 years.

Revision hips

	Female	Male
Number	4582	4862
Percentage	48.51	51.48
Mean age	69.96	69.76
Maximum age	97.72	95.78
Minimum age	17.52	25.68
Standard dev.	12.20	10.85

The percentage of revision hips to primary hips is 13% or a ratio of 1:7.7

REVISION OF REGISTERED PRIMARY HIP ARTHROPLASTIES

This section analyses data for revisions of primary hip procedures for the eleven-year period.

There were 1,870 revisions of the 62,767 primary conventional hip replacements (3.0%) and 22 revisions of the 912 resurfacing hip replacements (2.4%), a total of 1892.

Conventional hip arthroplasty analyses

Time to revision

Mean	1127 days
Maximum	3907 days
Minimum	0 days
Standard deviation	1068 days

Reason for revision

Dislocation	610
Loosening acetabular comp.	429
Loosening femoral component	321
Deep infection	252
Pain	177
Fracture femur	173
Implant breakage	36
Wear polyethylene	35
Osteolysis	30
Wear acetabulum	11
Subsidence of prostheses	7
Malposition of components	5
Tumour	4
Other	35

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

The percentages for the 4 main reasons for revision are;

Dislocation	33%
Loosening acetabular comp.	23%
Deep infection	17%
Loosening femoral component	13%

Analysis by time of the 4 main reasons for revision

Dislocation n = 610

< 6 months	255
6 months – 1 year	59
2 years	95
3 years	56
4 years	42
5 years	24
6 years	29
7 years	18
8 years	12
9 years	13

10 years	3
11 years	4

Loosening acetabular component n = 429

< 6 months	52
6 months – 1 year	28
2 years	44
3 years	40
4 years	36
5 years	32
6 years	29
7 years	47
8 years	37
9 years	40
10 years	33
11 years	11

Loosening femoral component n = 321

< 6 months	24
6 months – 1 year	19
2 years	42
3 years	35
4 years	33
5 years	30
6 years	34
7 years	33
8 years	27
9 years	21
10years	18
11 years	5

Deep infection n = 252

< 6 months	53
6 months – 1 year	29
2 years	51
3 years	41
4 years	21
5 years	19
6 years	11
7 years	9
8 years	7
9 years	7
10years	3
11 years	1

The numbers of revision for any of the above 4 reasons continues to trend down.

Time to revision for resurfacing hips

Mean	508 days
Maximum	1323 days
Minimum	10 days
Standard deviation	399 days

Reason for revision

Fracture femur/neck of femur	7
Loosening acetabular comp.	5
Deep infection	4
Loosening femoral component	1
Pain	1
Dislocation	1
Other	4

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.This method utilises the total number of protheses years in the Registry for calculating the revision rates. These rates are usually very low, hence they 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

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All Primary Hip Arthroplasties

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
All patients	62767	283728.3	1870	0.66	0.63	0.69

Revision versus hip prosthesis combinations sorted on revision rate/100 component years

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	4096	14775	69	0.47	0.36	0.59
Exeter V40	Trident	3696	11327	66	0.58	0.45	0.74
Spectron	Reflection cemented	2848	17221	125	0.73	0.60	0.87
Spectron	Reflection porous	2308	9521	60	0.63	0.48	0.81
Muller	Muller PE cup	1876	11290	39	0.35	0.25	0.47
Corail	Pinnacle	1853	2889	32	1.11	0.76	1.56
CLS	Morscher	1667	9809	60	0.61	0.47	0.79
Accolade	Trident	1598	6048	50	0.83	0.61	1.09
Exeter	Contemporary	1551	12194	88	0.72	0.58	0.89
TwinSys stem uncemented	RM Pressfit cup	1411	2336	22	0.94	0.59	1.43
Exeter V40	Exeter	1394	6353	26	0.41	0.27	0.60
Exeter	Exeter	1326	10009	64	0.64	0.49	0.82
Exeter V40	Trilogy	1267	4075	19	0.47	0.28	0.73
CLS	CLS Expansion	1190	6922	51	0.74	0.55	0.97
Spectron	Duraloc	1154	7745	72	0.93	0.73	1.17
Muller	RM cup	1006	5341	39	0.73	0.52	0.99
Exeter V40	Duraloc	968	4193	29	0.69	0.46	0.99
CLS	Fitmore	897	2802	23	0.82	0.52	1.23
Exeter	Osteolock	836	6637	38	0.57	0.41	0.79
Synergy Porous	Reflection porous	797	2613	15	0.57	0.32	0.95
MS 30	Morscher	779	4807	36	0.75	0.52	1.04
TwinSys stem uncemented	Selexys TPS	695	1049	16	1.52	0.87	2.48
CLS	Duraloc	694	4424	38	0.86	0.61	1.18
Summit	Pinnacle	677	1651	13	0.79	0.42	1.35
CLS	Fitek	672	4678	11	0.24	0.12	0.42
Exeter V40	Morscher	613	2726	18	0.66	0.39	1.04
Elite plus	Duraloc	608	3420	38	1.11	0.79	1.52
MS 30	Fitmore	591	1501	5	0.33	0.11	0.78
CCA	CCB	575	2312	7	0.30	0.12	0.62
Exeter	Duraloc	552	4611	39	0.85	0.60	1.16
Exeter	Morscher	551	4637	21	0.45	0.28	0.69
CPT	Trilogy	519	1572	18	1.14	0.68	1.81

CPT	ZCA	513	2955.	15	0.51	0.28	0.84
Corail	Duraloc	463	1781	8	0.45	0.19	0.88
MS 30	Muller PE cup	460	2652	13	0.49	0.26	0.84
Charnley	Charnley	456	2996	8	0.27	0.12	0.53
Exeter V40	Pinnacle	442	622	3	0.48	0.10	1.41
Exeter V40	RM Pressfit cup	433	912	5	0.55	0.18	1.28
Muller	Weber	430	2099	8	0.38	0.16	0.75
Versys cemented	ZCA	379	2136	12	0.56	0.30	0.98
ABGII	Trident	342	1364	15	1.10	0.62	1.81
Exeter V40	Reflection cemented	341	939	1	0.11	0.00	0.59
TwinSys stem cemented	RM Pressfit cup	312	534	2	0.37	0.05	1.35
Charnley	Charnley Cup Ogee	303	2128	12	0.56	0.29	0.98
Elite plus	Charnley	298	2328	14	0.60	0.33	1.01
Elite plus	Elite Plus LPW	282	1747	7	0.40	0.16	0.83
Versys	Trilogy	272	1967	10	0.50	0.24	0.93
Exeter V40	Osteolock	269	1579	7	0.44	0.18	0.91
S-Rom	Pinnacle	260	1030	9	0.87	0.40	1.66

There are 787 hip prosthesis combinations in the Registry 493 (63%) have fewer than 10 registered procedures and 259 (33%) one only. One of the reasons why there has been such a big jump in the number of combinations compared to last year is that some have been further defined eg CLS/RM has now had the RM pressfit split off into a separate group.

The table above contains the analyses of the 49 that have a minimum of 250 primary registered procedures. As stated above it is important to note the confidence intervals and observed component years in conjunction with the revision rates.

The Corail/Pinnacle, Spectron/ Duraloc, Twinsys uncem/Selexys and Elite plus/Duraloc have revision rates significantly higher than the overall rate of 0.66/100 ocys @ the 95% confidence interval.

Acetabular Components sorted on revision rate/ 100 component years

Minimum of 50 implantations

Acetabular_ Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Trident	6439	22438	154	0.67	0.58	0.80
Contemporary	6002	29068	177	0.61	0.52	0.71
Duraloc	5730	34837	290	0.83	0.74	0.93
Morscher	4099	25325	150	0.59	0.50	0.70
Reflection porous	3861	14393	91	0.63	0.51	0.78
Pinnacle	3807	7081	68	0.96	0.75	1.22
Trilogy	3437	12671	82	0.65	0.51	0.80
Reflection cemented	3339	18930	131	0.69	0.58	0.82
RM Pressfit cup	2862	5741	40	0.70	0.50	0.95
Muller PE cup	2823	16755	63	0.38	0.29	0.48
Exeter	2745	16502	91	0.55	0.44	0.68

RM cup	1715	7245	57	0.79	0.60	1.02
Fitmore	1689	5044	34	0.67	0.47	0.94
CLS Expansion	1577	9211	69	0.75	0.58	0.95
Fitek	1197	8297	31	0.37	0.25	0.53
Osteolock	1130	8392	51	0.61	0.45	0.80
ZCA	1098	5687	31	0.55	0.37	0.77
CCB	920	2865	7	0.24	0.10	0.50
Charnley	801	5577	26	0.47	0.30	0.68
Selexys TPS	719	1082	16	1.48	0.85	2.40
Delta-PF Cup	600	1574	8	0.51	0.22	1.00
Weber	555	2773	10	0.36	0.17	0.66
Monoblock Acetabular Cup	549	1907	17	0.89	0.52	1.43
Charnley Cup Ogee	374	2579	18	0.70	0.41	1.10
ASR	373	808	14	1.73	0.95	2.91
Trabecular Metal Shell	357	341	8	2.34	1.01	4.62
Elite Plus LPW	341	1921	10	0.52	0.25	0.96
Ultima	254	1309	6	0.46	0.17	0.99
Elite Plus Ogee	242	1223	5	0.41	0.13	0.95
Allofit	239	578	5	0.87	0.28	2.02
Durom	238	654	8	1.22	0.53	2.41
BHR Acetabular Cup	209	383	3	0.78	0.16	2.29
Mallory-Head	197	1015	6	0.59	0.22	1.29
Bio-clad poly	196	1192	7	0.59	0.24	1.21
R3 porous	177	144	1	0.69	0.02	3.86
ABGII	174	1463	13	0.89	0.47	1.52
M2A	173	700	4	0.57	0.16	1.46
Expansion Shell	127	360	5	1.39	0.45	3.24
Biomex acet shell porous	112	852	4	0.47	0.13	1.20
Weill ring	107	806	5	0.62	0.20	1.45
Marathon cemented	104	68	1	1.46	0.07	8.14
Recap Resurfacing Acetabular S	90	273	1	0.37	0.01	2.04
Artek	72	508	20	3.93	2.40	6.07
Expansion shell	63	178	3	1.68	0.35	4.90
Furlong cup	62	285	3	1.05	0.22	3.07
Mitch TRH System Cup	58	92	2	2.17	0.26	7.83
DeltaMotion Cup	57	21	0	0	0	16.88
Tritanium	51	10	0	0	0	36.19

The Artek, ASR, Selexys, Duraloc, Trabecular Metal Shell and Pinnacle cups have significantly higher revision rates than the overall rate of 0.66/100 ocys @ the95% confidence interval. However the fact that a component had been entered as revised does not necessarily mean it had failed or had to be replaced

Femoral Components sorted on revision rate/ 100 component years

Minimum of 50 implantations

Femur_ Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Exeter V40	14775	51692	261	0.50	0.45	0.57
Spectron	7191	3951551	286	0.72	0.64	0.81
CLS	6847	34695	252	0.73	0.64	0.82
Exeter	5748	45317	283	0.62	0.55	0.70
Muller	4047	21372	102	0.48	0.39	0.58
Corail	3026	6436	54	0.84	0.63	1.09
TwinSys stem uncemented	2764	4178	47	1.12	0.83	1.50
MS 30	2515	12446	69	0.55	0.43	0.70
Accolade	2001	7093	55	0.78	0.58	1.01
CPT	1680	7253	51	0.70	0.52	0.92
Elite plus	1351	8576	67	0.78	0.61	0.99
Synergy Porous	1055	3287	17	0.52	0.30	0.83
Summit	992	2605	22	0.84	0.53	1.28
CCA	948	4312	29	0.67	0.45	0.97
Charnley	824	5530	21	0.38	0.24	0.58
ABGII	751	3422	33	0.96	0.66	1.35
TwinSys stem cemented	673	1165	3	0.26	0.05	0.75
Versys cemented	641	3631	19	0.52	0.31	0.82
S-Rom	558	2419	25	1.03	0.67	1.53
C-Stem	414	1554	18	1.16	0.69	1.83
CBC Stem	398	1258	18	1.43	0.85	2.26
Versys	314	2154	14	0.65	0.36	1.09
Mallory-Head	247	1203	10	0.83	0.40	1.53
Omnifit	202	1138	8	0.70	0.30	1.38
ABG	189	1797	14	0.78	0.43	1.31
Trabecular Metal Stem	170	291	4	1.37	0.37	3.52
C-Stem AMT	163	205	3	1.46	0.30	4.26
Femoral Stem Press Fit	160	209	1	0.48	0.01	2.66
Wagner cone stem	157	918	11	1.20	0.60	2.14
Prodigy	149	1083	10	0.92	0.44	1.70
Friendly	147	345	2	0.58	0.07	2.09
Anthology Porous	115	123	1	0.81	0.02	4.52
Avenir Muller uncemented	109	45	0	0	0	8.04
DSP Thrust Plate	104	974	12	1.23	0.64	2.15
Basis	103	224	1	0.45	0.01	2.48
Charnley Modular	94	207	0	0	0	1.78
AML MMA	75	525	3	0.57	0.12	1.67
Furlong	74	295	4	1.35	0.37	3.47
Contemporary	71	583	6	1.03	0.38	2.24
CPCS	64	301	3	0.99	0.20	2.90
Modular Taperloc	59	193	1	0.52	0.01	2.88

AML	55	432	2	0.46	0.06	1.67
FTC	54	20	0	0	0	17.90
Zimmer M/L Taper	53	158	1	0.63	0.02	3.51

The CBC and Twinsys uncemented stems have significantly higher revision rates than the overall rate of 0.65/100 ocys @ the 95% confidence interval. The uncemented glenoids have a significantly higher revision rate despite overlap of the C.I.s. However the fact that a component had been entered as revised does not necessarily mean it had failed or had to be replaced.

Revision vs Bearing Surface Articulations 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							
Head Size mm	**Surfaces**	**No. Ops.**	**Observed comp. Yrs**	**Number Revised**	**Rate/100-component-years**	**Exact 95% confidence interval**	
<=28	CC	0					
<=28	CP	2700	13490	90	0.67	0.54	0.82
<=28	MM	297	1260	18	1.43	0.85	2.26
<=28	MP	4801	22734	142	0.62	0.53	0.74
>28	CC	57	21	0	0	0	16.88
>28	CP	143	186	1	0.54	0.01	2.98
>28	MM	1437	3772	52	1.38	1.03	1.81
>28	MP	1041	1766	11	0.62	0.31	1.11

The MM articulation for both head size groups had significantly higher revision rates when compared to MP articulation & to CP articulation with <=28mm head size.

Uncemented cups with liner							
Size	**Surfaces**	**No. Ops.**	**Observed comp. Yrs**	**Number Revised**	**Rate/100-component-years**	**Exact 95% confidence interval**	
<=28	CC	557	2351	25	1.06	0.69	1.57
<=28	CM	6	8	0	0	0	44.23
<=28	CP	4190	21319	158	0.74	0.63	0.87
<=28	MM	1436	10039	64	0.64	0.49	0.81
<=28	MP	14565	70722	510	0.72	0.66	0.79
>28	CC	3688	10002	77	0.77	0.60	0.96
>28	CM	180	142	0	0	0	2.58
>28	CP	1734	3136	27	0.86	0.57	1.25
>28	MM	1272	3315	25	0.75	0.49	1.11
>28	MP	3262	5633	40	0.71	0.51	0.97

The CC articulation with head size <= 28mm had a significantly higher revision rate when compared to CP & MP articulations despite some overlap in the CIs.

Cemented cups							
Size	Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
<=28	CP	363	2151	17	0.79	0.46	1.27
<=28	MP	16604	91524008	512	0.56	0.51	0.61
>28	CP	75	203	2	0.98	0.12	3.55
>28	MM	6	15	0	0	0	24.02
>28	MP	1230	2567	13	0.51	0.27	0.87

No significant difference among the groups.

Summation of the above 3 tables

Size	Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
<=28	CC	557	2351	25	1.06	0.69	1.57
<=28	CP	7253	36961	265	0.72	0.63	0.81
<=28	CM	6	8	0	0	0	8.24
<=28	MM	1733	11299	82	0.73	0.58	0.90
<=28	MP	35970	184981	1164	0.63	0.59	0.67
>28	CC	3745	10023	77	0.77	0.61	0.96
>28	CP	1952	3526	30	0.85	0.57	1.21
>28	CM	180	142	0	0	0	2.58
>28	MM	2715	7103	77	1.08	0.86	1.35
>28	MP	5533	9967	64	0.64	0.49	0.82

Overall with head size <= 28mm the CC articulation had a significantly higher revision rate when compared to the MP & for the >28mm head size, MM had a significantly higher revision rate compared to MP.

Summation of all bearing surfaces

Surfaces	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component- years	Exact 95% confidence interval	
CC	4302	12375	102	0.82	0.67	1.00
CP	9205	40488	295	0.73	0.65	0.82
CM	186	151	0	0	0	2.44
MM	4448	18402	159	0.86	0.73	1.01
MP	41503	194948	1228	0.63	0.56	0.63

Overall the metal on plastic bearing surface has a significantly lower revision rate than the other combinations.

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	9487	45798	401	0.88	0.79	0.96
55_64	15667	73043	533	0.73	0.67	0.79
65_74	20713	95243	598	0.63	0.58	0.68
GE75	16900	69642	338	0.49	0.43	0.54

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	
F	33257	150343	904	0.60	0.56	0.64
M	29510	133385	966	0.72	0.68	0.77

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	588	2973	32	1.08	0.74	1.52
10_25	5931	27513	204	0.74	0.64	0.85
26_50	30302	134374	923	0.69	0.64	0.73
51_75	13006	59023	360	0.61	0.55	0.68
76_100	5336	24339	129	0.53	0.44	0.63
GE100	6655	32001	194	0.61	0.52	0.70

Those surgeons performing <10 arthroplasties a year have 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	3002	15453	100	0.65	0.53	0.79
Posterior	38788	170315	1166	0.68	0.65	0.72
Lateral	17971	78616	468	0.60	0.54	0.65
Troch	123	633	7	1.11	0.44	2.28

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	3002	15453	27	0.17	0.12	0.25
Posterior	38788	170315	452	0.27	0.65	0.73
Lateral	17971	78616	100	0.13	0.54	0.65
Troch	123	633	1	0.16	0.00	0.88
Total		265018	580	0.22	0.20	0.24

The posterior approach has a significantly higher revision rate for dislocation compared to the lateral and anterior approaches.

Revision vs Arthroplasty Fixation

Cementation	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	19404	104944	574	0.55	0.50	0.59
Uncemented	20581	76248	625	0.82	0.76	0.89
Hybrid	22782	102535	671	0.65	0.61	0.71

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

Revision by Age Bands vs Arthroplasty Fixation

Cemented	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	559	3720	60	1.61	1.23	2.08
55_64	2019	13008	117	0.90	0.74	1.08
65_74	7139	41566	220	0.53	0.46	0.60
GE75	9687	46649	177	0.38	0.33	0.44
Uncemented						
LT55	6588	28511	218	0.76	0.67	0.87
55_64	7841	30078	238	0.79	0.69	0.90
65_74	4603	14034	130	0.93	0.77	1.10
GE75	1549	3624	39	1.08	0.77	1.47

Hybrid						
LT55	2340	13567	123	0.91	0.75	1.08
55_64	5807	29957	178	0.59	0.51	0.69
65_74	8971	39643	248	0.63	0.55	0.71
GE75	5664	19368	122	0.63	0.52	0.75

Revision by Arthroplasty Fixation vs Age Bands

LT55	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	559	3720	60	1.61	1.23	2.08
Uncemented	6588	28511	218	0.76	0.67	0.87
Hybrid	2340	13567	123	0.91	0.75	1.08
55_64						
Cemented	2019	13008	117	0.90	0.74	1.08
Uncemented	7841	30078	238	0.79	0.69	0.90
Hybrid	5807	29957	178	0.59	0.51	0.69
65_74						
Cemented	7139	41566	220	0.53	0.46	0.61
Uncemented	4603	14034	130	0.93	0.77	1.10
Hybrid	8971	39643	248	0.63	0.55	0.71
GE75						
Cemented	9687	46649	177	0.38	0.33	0.44
Uncemented	1549	3624	39	1.08	0.77	1.47
Hybrid	5664	19368	122	0.63	0.52	0.75

For the under 55 age band the revision rate for uncemented and hybrid group is significantly lower than for cemented hips;
For age band 55 – 64 hybrid hips have a significantly lower revision rate than both cemented and uncemented hips, but there is no significant difference between the latter two;
For the 65 – 74 age band both cemented and hybrid hips have significantly lower revision rates than uncemented.
For the >74 age band cemented hips have a significantly lower revision rate than both hybrid and uncemented hips and in turn hybrid hips have a significantly lower revision rate than uncemented hips.

Overall the hybrid hip is demonstrating the lowest revision rate across all 4 age bands.

Revision vs ASA status

ASA Class	No. Ops.	Observed Comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1	5144	11006	89	0.81	0.65	0.99
2	16863	35921	266	0.74	0.65	0.84
3	6389	12982	117	0.90	0.75	1.08
4	200	384	4	1.04	0.28	2.66

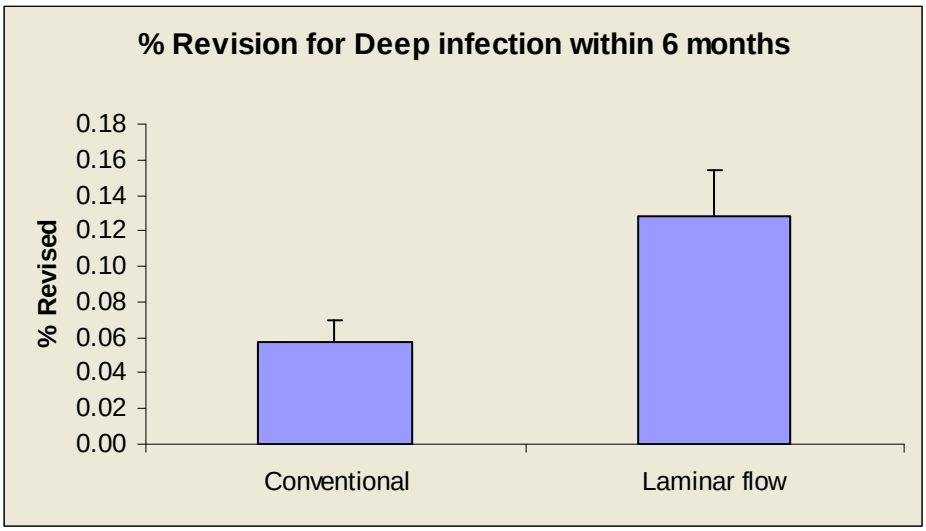
Revision vs ASA public private hospitals

Public/Private	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1	14440	30644	240	0.78	0.69	0.89
2	14156	29650	236	0.80	0.70	0.90

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

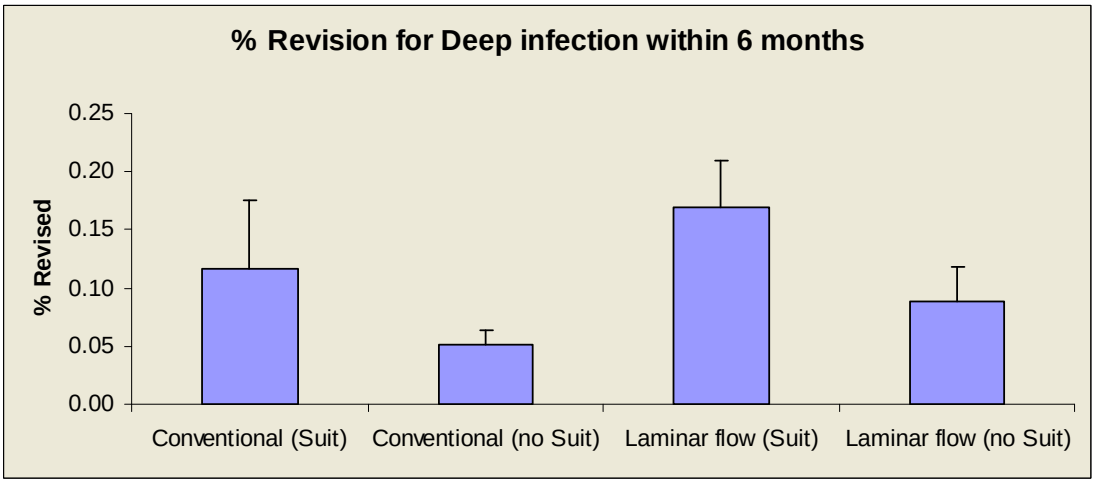
Revision for Deep Infection within 6 months vs Theatre Environment

Theatre	Total Number	Number Revised	%	SE
Conventional	38072	22	0.06	0.01
Laminar flow	20193	26	0.13	0.03



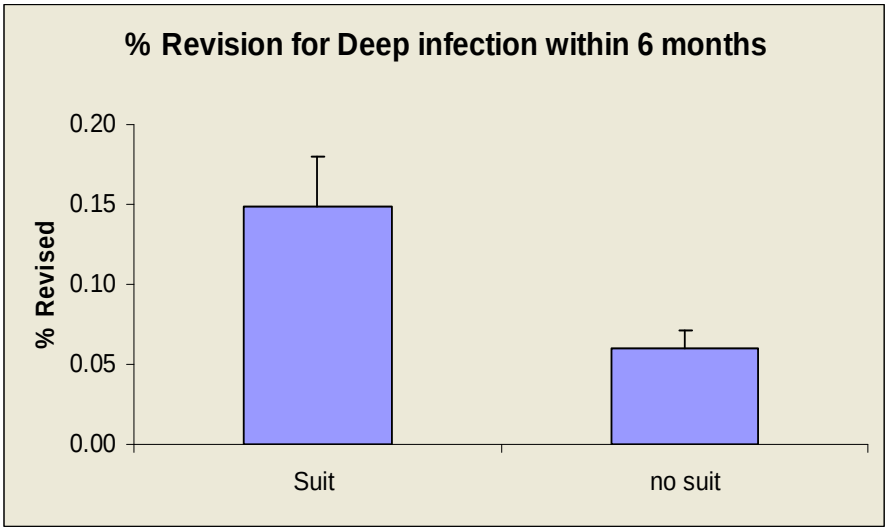
There is a significant difference in revision rates for deep infection within 6 months of surgery between conventional and laminar flow theatres.

		Total Number	Number Revised	%	SE
Conventional	Suit	3412	4	0.12	0.06
	No suit	34660	18	0.05	0.01
Laminar flow	Suit	10074	17	0.17	0.04
	No suit	10119	9	0.09	0.03



There is a significant difference in the revision rates between conventional/ no suit and laminar flow/suit environments. There is 3.3 times the risk for revision in the latter compared to the former environment.

	Total Number	Number Revised	%	SE
Suit	14171	21	0.15	0.03
No suit	45143	27	0.06	0.01

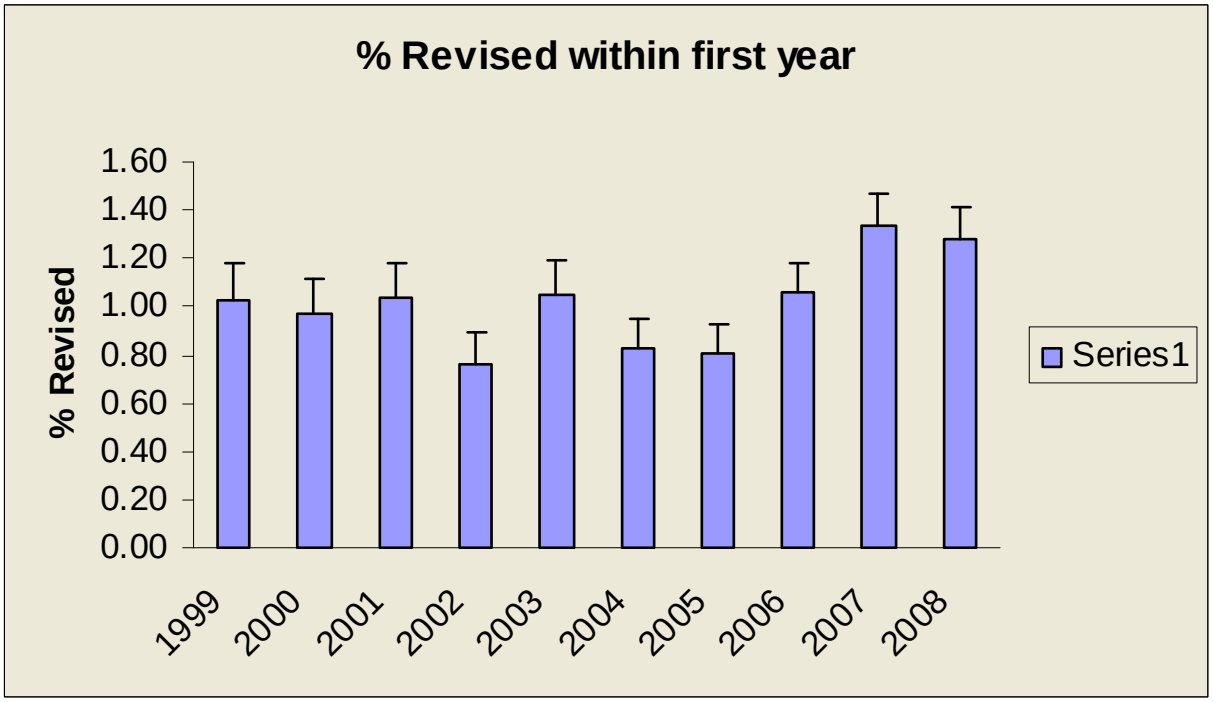


Furthermore there is a significant increase in revision rates when suits are used in either conventional or laminar flow theatres.

From the above data it would appear that the use of space suits increases the risk of deep infection threefold within the first 6 months following hip arthroplasty

Percentage of hips revised in the first year

The following two bar graphs show that the % of hips revised in the first year after arthroplasty has fallen slightly from the 2007 peak.



Resurfacing Arthroplasty

All patients	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
	910	2110	22	1.04	0.65	1.58

Resurfacing prosthesis vs revision rate

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Adept	4	7	0	0	0	51.87
ASR	131	426	7	1.64	0.66	3.38
BHR	750	1639	12	0.73	0.38	1.28
BMHR	8	3	0	0	0	112.36
Conserve Superfinish	4	1	0	0	0	217.38
Durom	4	22	0	0	0	16.57
Mitch TRH Resurfacing Head	9	10	3	29.96	6.18	87.54

The Mitch TRH has very significantly higher revision rate

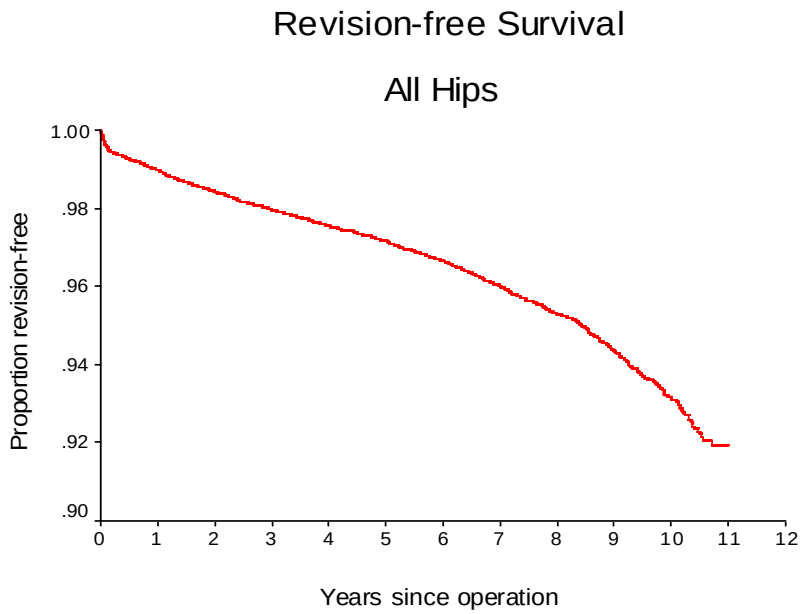
Resurfacing Hip Arthroplasty; head size vs revision rate

Hips resurfacing head size	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
<=44	80	156	5	3.19	1.04	7.44
45-49	231	544	7	1.29	0.52	2.65
50-54	534	1215	8	0.66	0.28	1.30
>=55	66	201	2	0.99	0.12	3.59

There are no significant differences among the components due to wide CIs

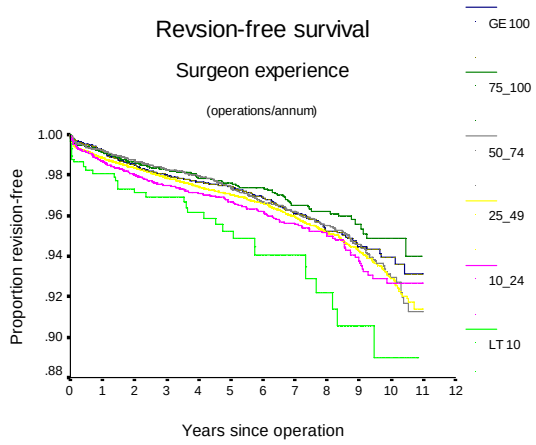
Kaplan Meier Curves

The following Kaplan Meier survival analyses are for the years 1999 – 2009 with deceased patients censored at time of death.



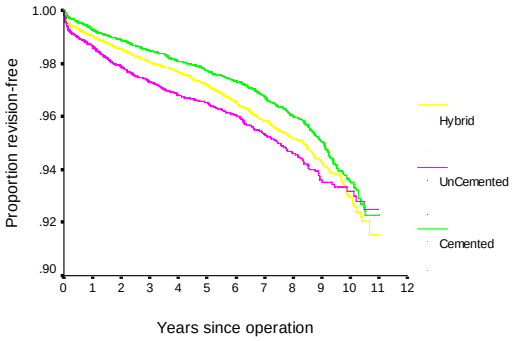
Years	% Revision-free
1	98.96
2	98.43
3	97.95
4	97.54
5	97.15
6	96.65
7	95.99
8	95.28
9	94.35
10	93.10

The KM analysis is to10yrs rather than 11 as too few registered hips were revised in 2009



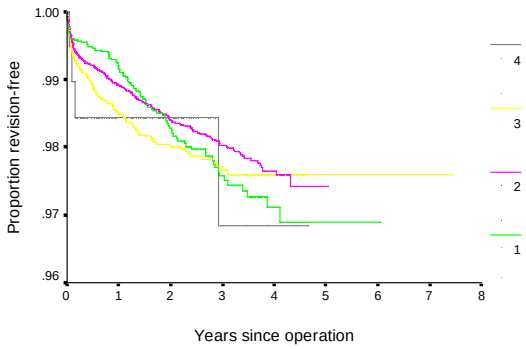
Revision-free survival

Cementation



Revsion-free survival

ASA



Survival at ten years

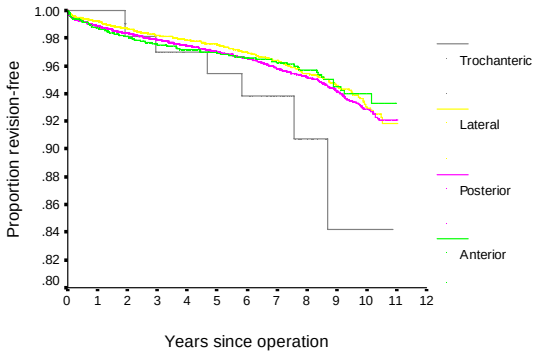
Cemented hips	93.51%
Uncemented hips	93.19%
Hybrid hips	92.94%

The gap between the survival for cemented vs uncemented hips has closed at the ten year mark.

Deep infection free survival

Revison-free survival

Surgical approach



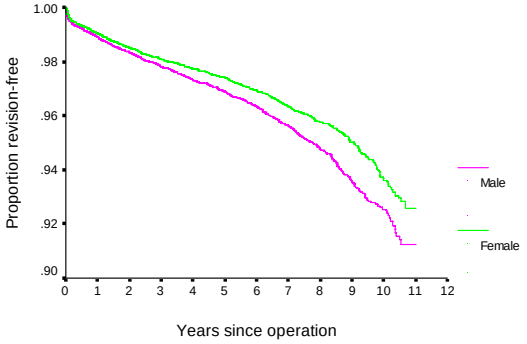
Re-revisions of conventional hips

Analysis was undertaken of 3 groups of hip re-revisions.

There were 214 registered conventional hip replacements that had been revised twice, 43 that had been revised three times and 7 that had been revised four times.

Revision-free survival

Gender



Second revision

Time between the first and second revisions averaged 512 days, with a range of 2 – 2984 and a standard deviation of 579. This compares to an average of 1127 days between the primary and first revision.

Reason for revision

Dislocation	
Deep infection	58
Loosening acetabular	29
Loosening femoral	27
Pain	21
Fracture femur	11
Other	14

Revision

Change of head	79
Change of acetabular	120
Change of liner	84
Change of all	54
Change of femoral	58

Third revision

The average time between second and third revisions for the 43 arthroplasties was 426 days with a range of 4 – 1665 and a standard deviation of 393.

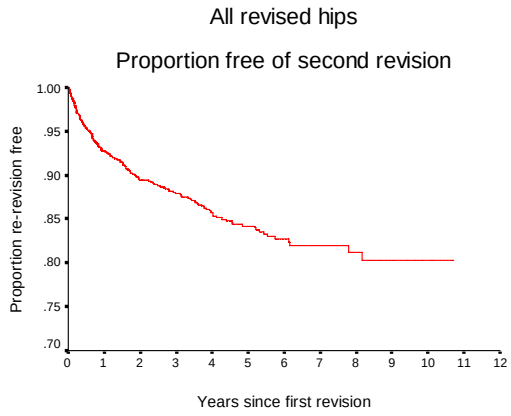
Fourth revision

The average time between the third and fourth revisions for the 7 arthroplasties was 298 days with a range of 25 – 679 and a standard deviation of 254.

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

Re- revisions of resurfacing hip replacements

There have been 5 re-revisions.
The time between the first and second revisions averaged 404 days, with a range of 25 – 908 and a standard deviation of 409.



The KM graph confirms that survival following the first revision is poorer than for primary arthroplasty

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTHS, FIVE-YEARS AND 10-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 eleven year period, and as at August 2010, there were 20,909 primary hip questionnaire responses registered at six months post surgery. The mean hip score was 40.68 (standard deviation 7.43, range 48 – 2)

Scoring > 41	12126
Scoring 34 -41	5586
Scoring 27 -33	1952
Scoring < 27	1245

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 4,692 individual patients.

At six months post surgery, 88% of these patients had an excellent or good score and had a mean of 41.54.

At five years post surgery, 89% of these patients had an excellent or good score and had a mean of 42.52.

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 1,097 individual patients.

At six months post surgery, 91% of these patients had an excellent or good score and had a mean of 42.10.

At ten years post surgery, 86% of these patients had an excellent or good score and had a mean of 41.52.

Analysis of the individual questions at six months, five years and ten years post surgery
Analyses of the individual questions showed that the most common residual complaint at 6 months was limping (Q10) However, for the ten-year analysis the biggest change was a significant increase in the percentage with pain Q1). Apart from those two categories there had been little change in the others over the 10 year period, which affirms that the six-month score is indicative of the longer term outcome.

Percentage scoring 0 or 1 (worst categories) for each question (n=20,909) at six months, at five years post surgery (n = 4,692) and at ten years post surgery (n= 1097).

		% 6m	% 5y	% 10y
1	Moderate or severe pain from the operated hip	8	8	17
2	Only able to walk around the house or unable to walk before pain becomes severe	4	3	5
3	Extreme difficulty or impossible to get in and out of a car or public transport	2	2	4
4	Extreme difficulty or impossible to put on a pair of socks	9	6	8
5	Extreme difficulty or impossible to do the household shopping on your own	4	3	4
6	Extreme difficulty or impossible to wash and dry yourself	2	1	2
7	Pain interfering greatly or totally with your work	4	3	4
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	1	1	2
10	Limping most or every day	13	9	8
11	Extreme difficulty or impossible to climb a flight of stairs	4	4	5
12	Pain from your hip in bed most or every nights	5	3	5

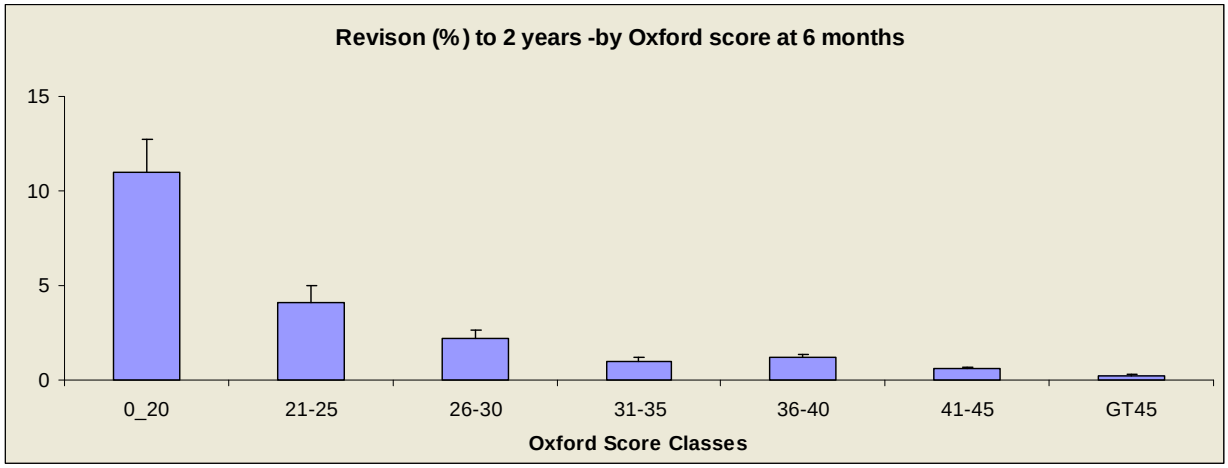
Revision hip questionnaire responses
There were 5,014 revision hip responses with 66% achieving an excellent or good score. This group includes all revision hip procedures. The mean revision hip score was 35.95 (standard deviation 9.41, range 48 – 1)

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 scores in groups of 5, except at the range extremes, against the proportion of hips revised for that same group it demonstrates that there is an incremental increase in risk during the first 2 years related to the oxford score. A patient with a score below 20 has 19 times the risk of a revision within 2 years compared to a person with a score 41 to 45

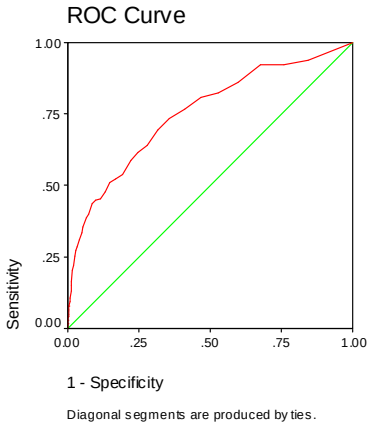


A person with an oxford score of 41-45 has a 0.58% risk of revision within two years compared to a 11.02% risk with a score of 20 or less.

A ROC analysis has demonstrated that a patient with a score less than or equal to 39.5 has 4.9 times the risk of needing a revision within 2 years compared to a person with a score greater than 39.5.

Alternatively the ROC analysis predicted 70% of the revisions within 2 years from just the lowest 30% of Oxford scores.

ROC curve at six months versus revision within two years



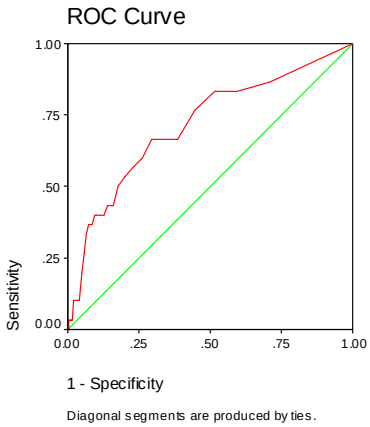
A receiver operating characteristic (ROC) curve is a graphical representation of the trade off between the false negative and false positive rates for every possible cut off. Equivalently, the ROC curve is the representation of the tradeoffs between sensitivity and specificity. The more the curve climbs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

Five year score and revision arthroplasty

The ROC analysis at 5 years has demonstrated that a patient with a score less than or equal to 41.5 has 5.25 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 67% of the revisions within 2 years from just the lowest 30% of Oxford scores

ROC curve at five years versus revision within two years



KNEE ARTHROPLASTY

PRIMARY KNEE ARTHROPLASTY

The eleven-year report analyses data for the period January 1999 – December 2009. There were 46,090 primary knee procedures registered, an additional 6,012 compared to last year's report.
This includes 121 patello-femoral prostheses with 23 registered in 2009.

1999	2429
2000	3015
2001	3059
2002	2895
2003	3046
2004	4098
2005	5025
2006	5151
2007	5759
2008	5601
2009	6012

There has been a 7.3% increase in registrations for 2009, a reversal of the 3% decrease for 2008.

DATA ANALYSIS

Age and sex distribution

The average age for a knee replacement was 68.59 years, with a range of 8.19 – 100.49 years.

All knee arthroplasty

	Female	Male
Number	23831	22259
Percentage	51.71	48.29
Mean age	68.98	68.18
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.95	9.45

Conventional knee arthroplasty

	Female	Male
Number	23738	22231
Percentage	51.64	48.36
Mean age	69.00	68.18
Maximum age	100.49	98.68
Minimum age	10.17	8.19
Standard dev.	9.94	9.45

Patello-femoral arthroplasty

	Female	Male
Number	93	28
Percentage	76.86	23.14
Mean age	63..07	61.63
Maximum age	87.75	83.63
Minimum age	32.93	34.38
Standard dev.	11.07	11.40

Previous operation

None	38337
Meniscectomy	4775
Osteotomy	879
Arthroscopy/debridement	766
Ligament reconstruction	471
Internal fixation for juxtarticular fracture	337
Patellectomy	185
Synovectomy	95
Removal of loose body	34
Other	103

Diagnosis

Osteoarthritis	43098
Rheumatoid arthritis	1365
Post fracture	493
Other inflammatory	442
Post ligament disruption /reconstruction	283
Avascular necrosis	171
Tumour	53
Other	79

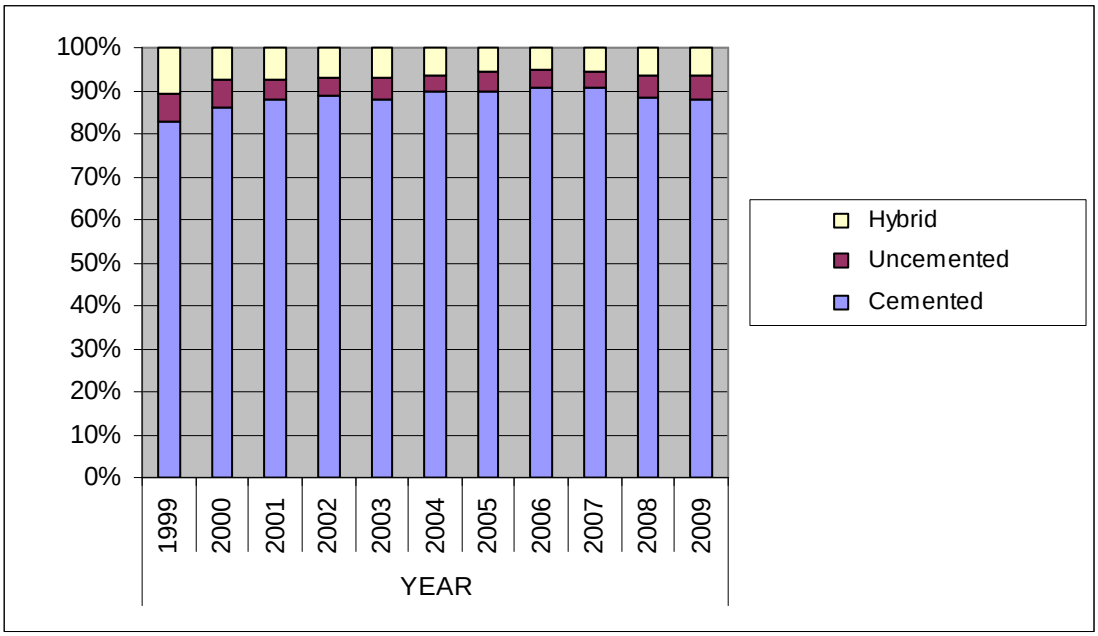
Approach

Medial parapatellar	41795
Other	1223
Lateral parapatellar	808
Image guided surgery	2794
Minimally invasive surgery	97

Image guided surgery was added to the updated forms at the beginning of 2005 and in 2009 was used for 14% of primary knee arthroplasties.

Bone graft

Femoral autograft	86
Femoral allograft	9
Femoral synthetic	2
Tibial autograft	40
Tibial allograft	14



Cement

Femur cemented	41109	89%
Antibiotic in cement	26901	65%
Tibia cemented	43560	95%
Antibiotic in cement	28039	64%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	43588	95%

A cephalosporin was used in 89% of arthroplasties.

Operating theatre

Conventional	27068
Laminar flow	18616
Space suits	13199

In 2009, 53% of knee arthroplasties were performed in laminar flow theatres and space suits were used in 42%; similar to 2009.

ASA Class

This was introduced with the updated forms at the beginning of 2005. For the five-year period 2005 – 2009, there were 24,495 (89%) 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	2759	11
2	15522	63
3	6093	25
4	121	1

Operative time (skin to skin)

Mean	84 minutes
Standard deviation	26 minutes
Minimum	24 minutes
Maximum	431 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the five-year period 2005 – 2009.

Consultant	24290
Advanced trainee supervised	2010
Basic trainee	639
Advanced trainee unsupervised	475

Prosthesis usage

Patello-femoral prostheses

Avon-patello	106
LCS PFJ	6
Journey	4
Gender	2
Mod 3	1
RBK	1
Themis	1

There are 121 patello-femoral procedures registered to 39 surgeons. Avon- patello is the most common prosthesis at 88% of the total.

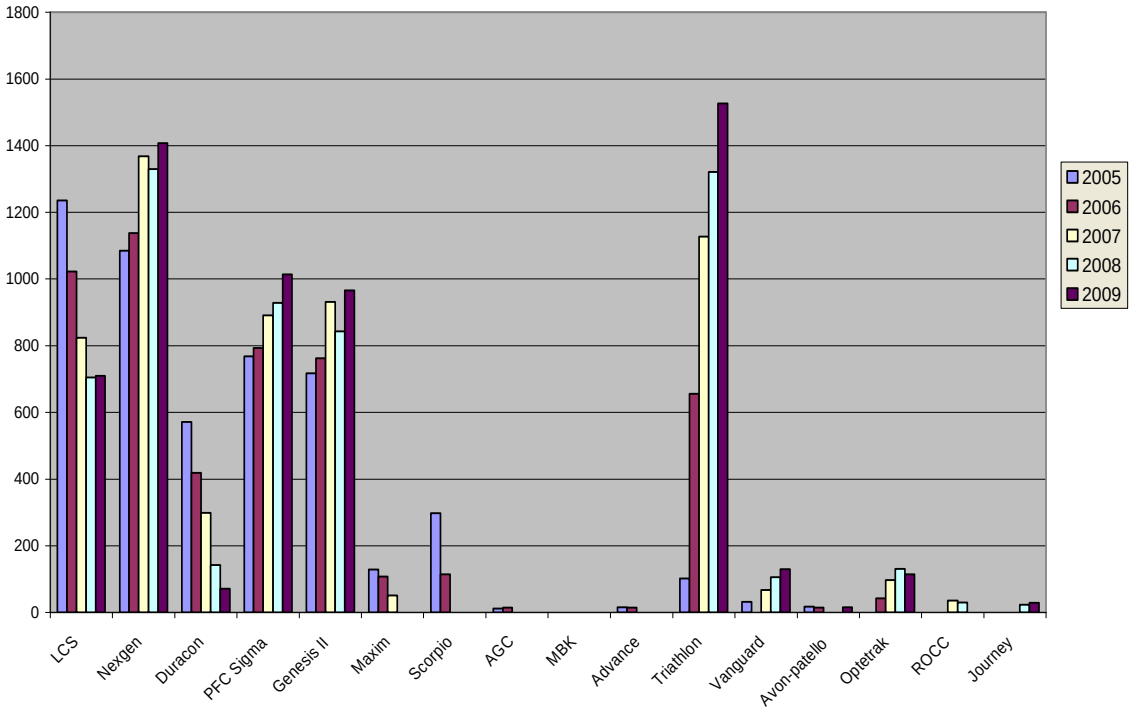
Conventional primary knees

Top 10 knee prostheses used in 2009

Triathlon	1527
Nexgen	1407
PFC Sigma	1014
Genesis II	966
LCS	709
Vanguard	130
Optetrak	114
Duracon	71
Journey	29
RPS	7

The Triathlon has moved to the top of the table and the RPS has displaced the ROCC at the bottom in 2009.

Most Used Knee Prosthesis 2005-2009



The Triathlon continues its rapid climb over the last five years.

Patellar resurfacing
32,292 (70%) of the conventional knee procedures were registered with the patella not resurfaced and 13,677 (30%) resurfaced.

Surgeon and hospital workload

Surgeons
In 2009, 194 surgeons performed 6,012 total knee replacements, an average of 31 procedures per surgeon.32 surgeons performed less than 10 procedures and 47 performed more than 40.

Hospitals
In 2009 primary knee replacement was performed in 50 hospitals. 25 were public hospitals and 25 were private.
For 2009 the average number of total knee replacements per hospital was 120.

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 eleven-year period January 1999 – December 2009, there were 3,726 revision knee procedures registered. This is an additional 433 compared to last year's report.

The average age for a revision knee replacement was 69.98 years, with a range of 10.57 – 98.39 years.

Revision knees

	Female	Male
Number	1788	1938
Percentage	47.99	52.01
Mean age	70.46	69.53
Maximum age	95.79	98.39
Minimum age	10.57	15.49
Standard dev.	10.64	10.10

The percentage of revision knees to primary knees is 8% and a ratio of 1:12.5.

REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTIES

This section analyses data for revisions of the primary knee procedures for the eleven-year period.

There were 1027 revisions of the 45,969 primary conventional knee replacements (2.2%) and 9 revisions of the 121 patello-femoral prostheses (7.4%).

Conventional knee arthroplasty analyses

Time to revision

Mean	919 days
Maximum	3840 days
Minimum	1 day
Standard deviation	799 days

Reason for revision

Pain	317
Deep infection	267
Primary patellar component	234
Loosening tibial component	232
Loosening femoral component	124
Instability	76
Stiffness	44
Dislocation component	31
Fracture tibia	18
Loosening patellar com.	16
Wear component	15
Malalignment	14
Fracture femur	13
Implant breakage	11
Osteolysis	7
Other	46

There was often more than 1 reason for revision listed and all were entered.

Analysis by time of the 5 main reasons for revision

Pain n = 317

< 6 months	15
6 months – 1 year	53
2 years	110
3 years	50
4 years	36
5 years	20
6 years	11
7 years	6
8 years	6
9 years	5
10 years	3
11 years	1

Deep infection n = 267

< 6 months	64
6 months – 1 year	52
2 years	64
3 years	28
4 years	27
5 years	8
6 years	6
7 years	8
8 years	6
9 years	2
10 years	1
11 years	1

Addition of patellar component n = 234

< 6 months	9
6 months – 1 year	46
2 years	87
3 years	41
4 years	26
5 years	9
6 years	6
7 years	3
8 years	3
9 years	3
10 years	0
11 years	1

Loosening tibial component n = 232

< 6 months	8
6 months – 1 year	18
2 years	39
3 years	43
4 years	37
5 years	27
6 years	14
7 years	15
8 years	17
9 years	6
10 years	7
11 years	1

Loosening femoral component n = 124

< 6 months	2
6 months – 1 year	9
2 years	23
3 years	16
4 years	13
5 years	21
6 years	9
7 years	10
8 years	14
9 years	4
10 years	3
11 years	0

As with hips, the revision numbers for any of the above 4 reasons continues to trend down.

Patello-Femoral Arthroplasty

Time to revision for patello-femoral knees

Mean	837 days
Maximum	1194 days
Minimum	126 days
Standard deviation	416 days

Reason for revision

Pain	5
Loosening patellar	2
Progression of disease	2

Patellar resurfacing

As noted previously, 70 %(32,292) of the 45,969 conventional primary knees registered were not resurfaced and 30% (13,677) were resurfaced.
Of the group that was not resurfaced, 155 (0.4%) had the patella later resurfaced as the only revision procedure and a further 78 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 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.This method utilises the total number of protheses years in the Registry for calculating the revision rates. These rates are usually very low, hence they 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 Total Knee Arthroplasties

All Patients	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
	45969	193360	1027	0.53	0.50	0.56

Revision rate of individual knee prostheses

Minimum of 50 primary registered arthroplasties

Prosthesis	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
PFC Sigma cemented	6369	24029	102	0.42	0.35	0.52
Genesis II cemented	6081	22087	119	0.54	0.45	0.65
Triathlon cemented	4624	7941	29	0.37	0.25	0.52
Nexgen cemented	4105	19822	76	0.38	0.30	0.48
LCS Complete cemented	3809	13825	75	0.54	0.43	0.68
LCS cemented	3575	27286	138	0.51	0.43	0.60
Duracon cemented	3416	19091	59	0.31	0.24	0.40
Nexgen LPS-Flex cemented	2932	7434	59	0.79	0.60	1.02
Nexgen LPS cemented	2211	10153	59	0.58	0.44	0.75
LCS Complete uncemented	1944	5529	58	1.05	0.80	1.36
LCS uncemented	1091	8213	70	0.85	0.66	1.08
Scorpio	850	4186	39	0.93	0.66	1.27
Maxim	820	4776	14	0.29	0.16	0.49
Duracon uncemented	770	4682	15	0.32	0.18	0.53
Nexgen uncemented	405	2022	11	0.54	0.27	0.97
AGC cemented	376	2707	9	0.33	0.15	0.63
Insall/Burstein	249	2021	39	1.93	1.37	2.64
Nexgen CR-Flex Cemented	249	312	2	0.64	0.08	2.31
Optetrak cemented	244	521	8	1.53	0.66	3.02
Vanguard (TM) CR	237	312	4	1.28	0.35	3.28
PFC Sigma uncemented	233	671	3	0.45	0.09	1.31
MBK cemented	222	1641	10	0.61	0.29	1.12
Optetrak uncemented	176	276	2	0.72	0.09	2.62
Advance cemented	157	998	5	0.50	0.16	1.17
Triathlon uncemented	106	157	2	1.27	0.15	4.60
AMK cemented	95	823	1	0.12	0.00	0.68
Cruciate Retained uncemented	75	291	1	0.34	0.01	1.91
Journey	57	52	1	1.90	0.05	10.56

There are 83 different knee prostheses registered within the registry

The table above contains the analyses of the 28 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.

The 2 LCS uncemented and the Scorpio prostheses have significantly higher revision rates than the overall rate of 0.53/100 ocys @ the 95% confidence interval. The LCS Complete is the only one of these 3 prostheses was implanted (346) in 2009

Revision vs Age Bands

Age Bands	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	3809	15964	164	1.027	0.88	1.20
55_64	12156	50431	348	0.69	0.62	0.77
65_74	17171	73572	363	0.49	0.44	0.55
GE75	12833	53391	152	0.28	0.24	0.33

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

Revision vs Gender

Gender	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
F	23738	101954	495	0.49	0.44	0.53
M	22231	91405	532	0.58	0.53	0.63

The revision rate for males is significantly higher than for females

Revision vs Arthroplasty Fixation

Cementation	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Cemented	40779	170410	854	0.50	0.47	0.54
Uncemented	2185	9280	96	1.03	0.84	1.26
Hybrid	3005	13668	77	0.56	0.44	0.70

Hybrid knee: tibia uncemented, femur cemented

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 by Age Bands vs Arthroplasty Fixation

Cemented	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	3021	12477	109	0.87	0.72	1.05
55_64	10446	42960	283	0.66	0.58	0.74
65_74	15495	66049	328	0.50	0.44	0.55
GE75	11817	48923	134	0.27	0.23	0.32

Each of the higher 3 age bands has a significantly lower revision rate than the preceding age band

Uncemented	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	441	2119	41	1.93	1.39	2.62
55_64	789	3372	34	1.01	0.70	1.41
65_74	639	2561	15	0.59	0.33	0.97
GE75	316	1227	6	0.49	0.18	1.06

Each of the higher 3 age bands has a significantly lower revision rate than the preceding age band

Hybrid	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT55	347	1367	14	1.02	0.56	1.72
55_64	921	4098	31	0.76	0.51	1.07
65_74	1037	4961	20	0.40	0.25	0.62
GE75	700	3240	12	0.37	0.19	0.65

The 2 older age bands have significantly lower revision rates than the younger 2

Revision vs Approach

Approach	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Medial	41680	168002	895	0.53	0.50	0.57
Lateral	805	3956	22	0.56	0.35	0.84
Other	1218	6115	26	0.43	0.28	0.62

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	43175	188233	992	0.53	0.49	0.56
Yes	2794	5126	35	0.68	0.48	0.95

Although there is no significant difference in the revision rate between the 2, the anticipated advantages of image guided arthroplasty are not yet apparent.

Revision versus annual surgeon output

Operations per Year	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
LT10	1041	5069.25	28	0.55	0.37	0.80
10_25	9085	40408.86	231	0.57	0.50	0.65
25_50	22319	92912.89	474	0.51	0.46	0.56
50_75	8703	34040.96	193	0.57	0.49	0.65
75_100	1962	8464.65	29	0.34	0.23	0.49

There is no significant difference among the lower 4 groups but those doing 75 plus arthroplasties per year do have a significantly lower revision rate

Revision vs ASA status

ASA Class	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
1	2739	5677.78	40	0.70	0.50	0.96
2	15473	32810.88	216	0.66	0.57	0.75
3	6081	12791.08	81	0.63	0.50	0.79
4	121	257.42	1	0.39	0.01	2.16

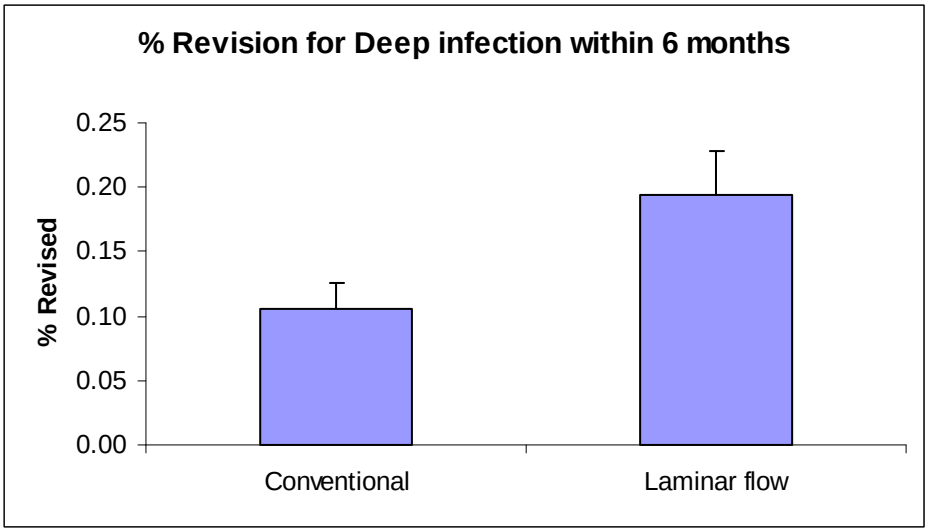
There is no significant difference among the 4 classes

	No. Ops.	Observed comp. Yrs	Number Revised	Rate/100-component-years	Exact 95% confidence interval	
Public	12559	27419.72	182	0.66	0.57	0.77
Private	11855	24117.45	156	0.65	0.55	0.76

There is no significant difference between the 2 groups

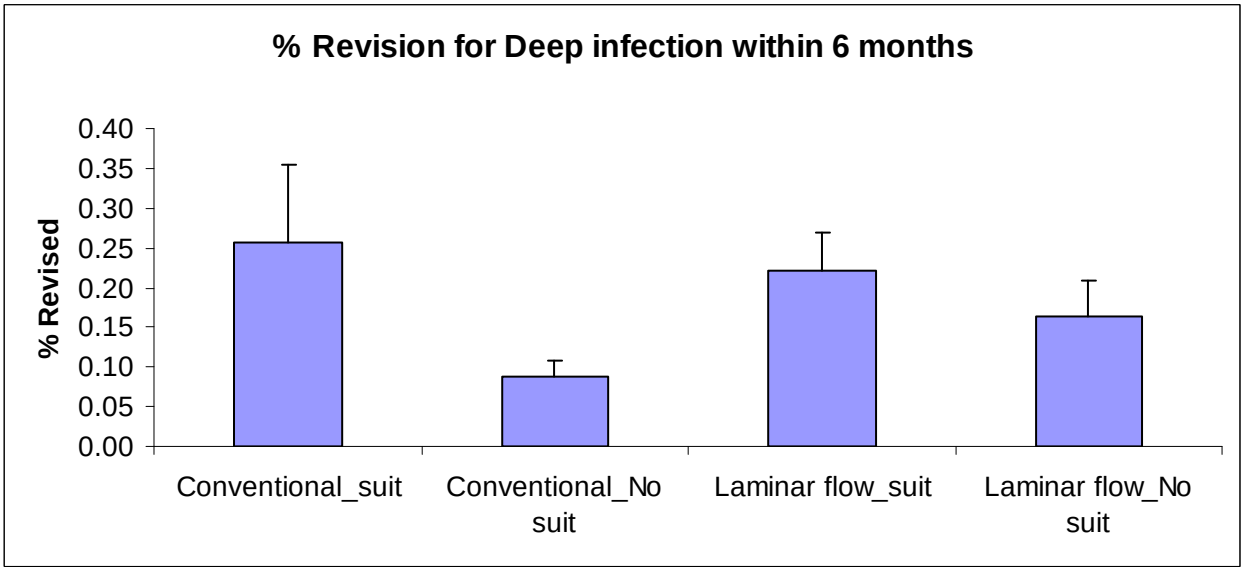
Revision for Deep infection within 6 months versus theatre environment

	Total Number	Number revised	%	SE
Conventional	25592	27	0.11	0.02
Laminar flow	17015	33	0.19	0.03



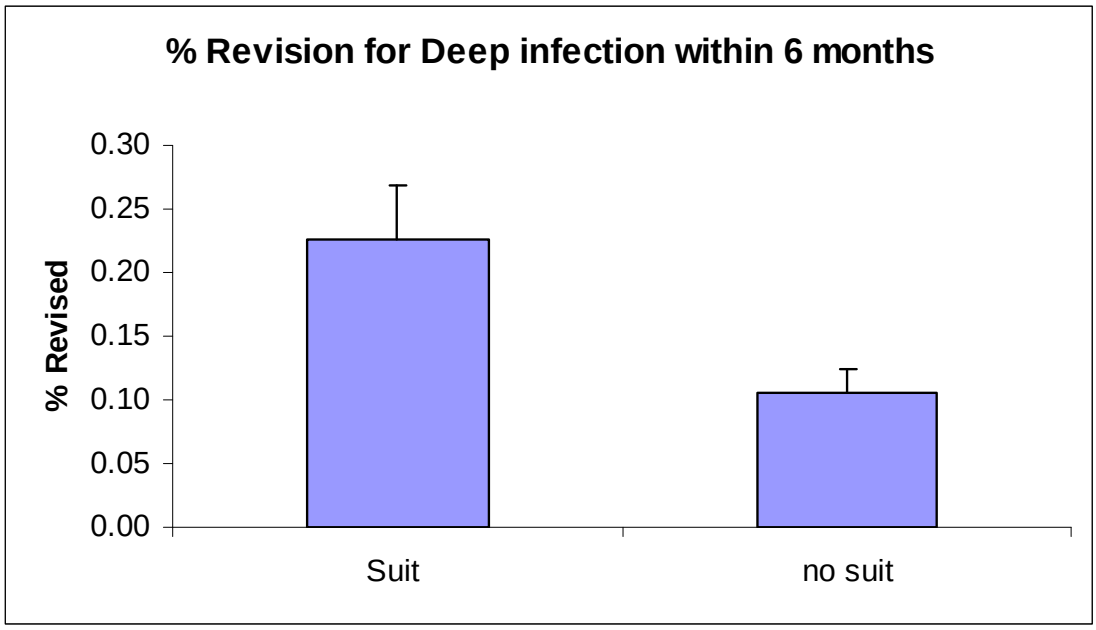
As with hip arthroplasty there is a significant difference in knee revision rates for deep infection within 6 months of surgery between conventional and laminar flow theatres.

	Total Number	Number revised	%	SE
Conventional Suit	2716	7	0.26	0.10
Conventional No suit	22876	20	0.09	0.02
Laminar flow Suit	9078	20	0.22	0.05
Laminar flow No suit	7937	13	0.16	0.05



There is a significant difference in the revision rates between conventional/no suit and conventional/suit environments. There is 3 times the risk for revision in the latter compared to the former environment.

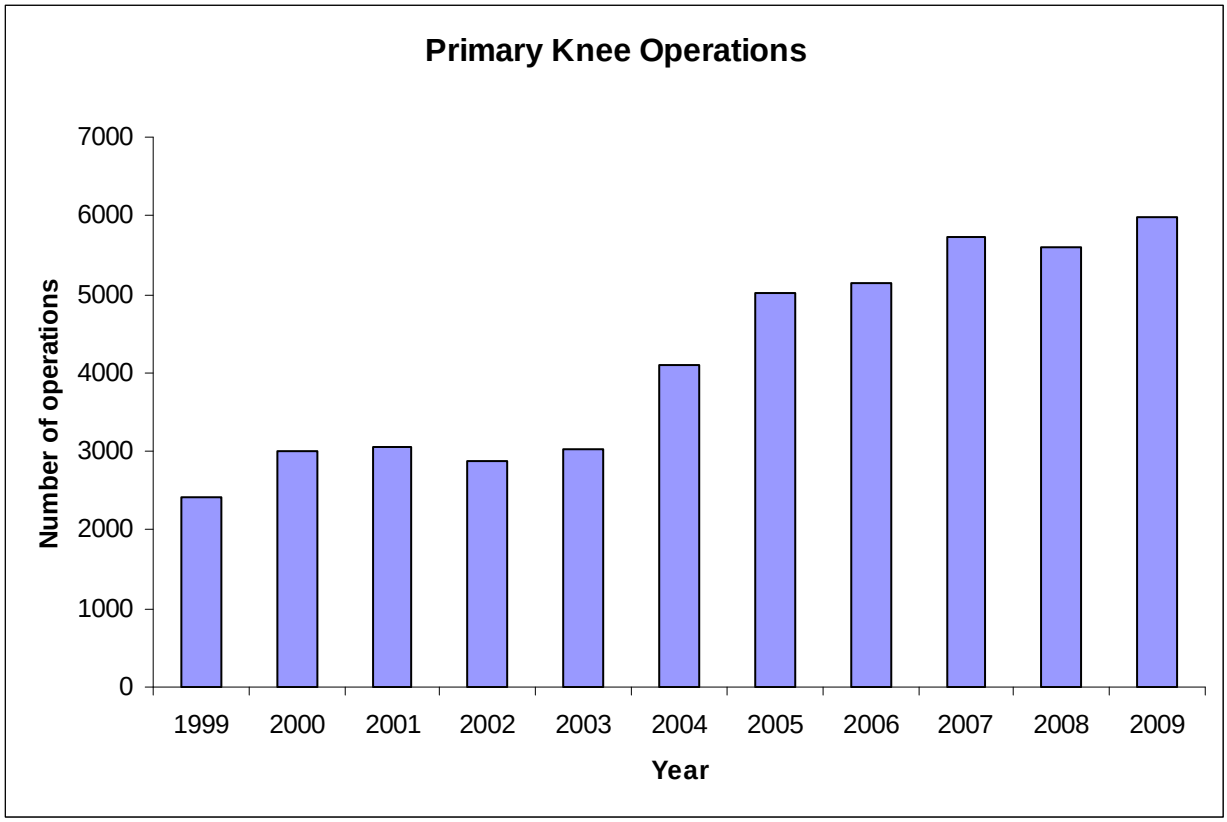
	Total Number	Number revised	%	SE
Suit	11979	27	0.23	0.04
No suit	31078	33	0.11	0.02

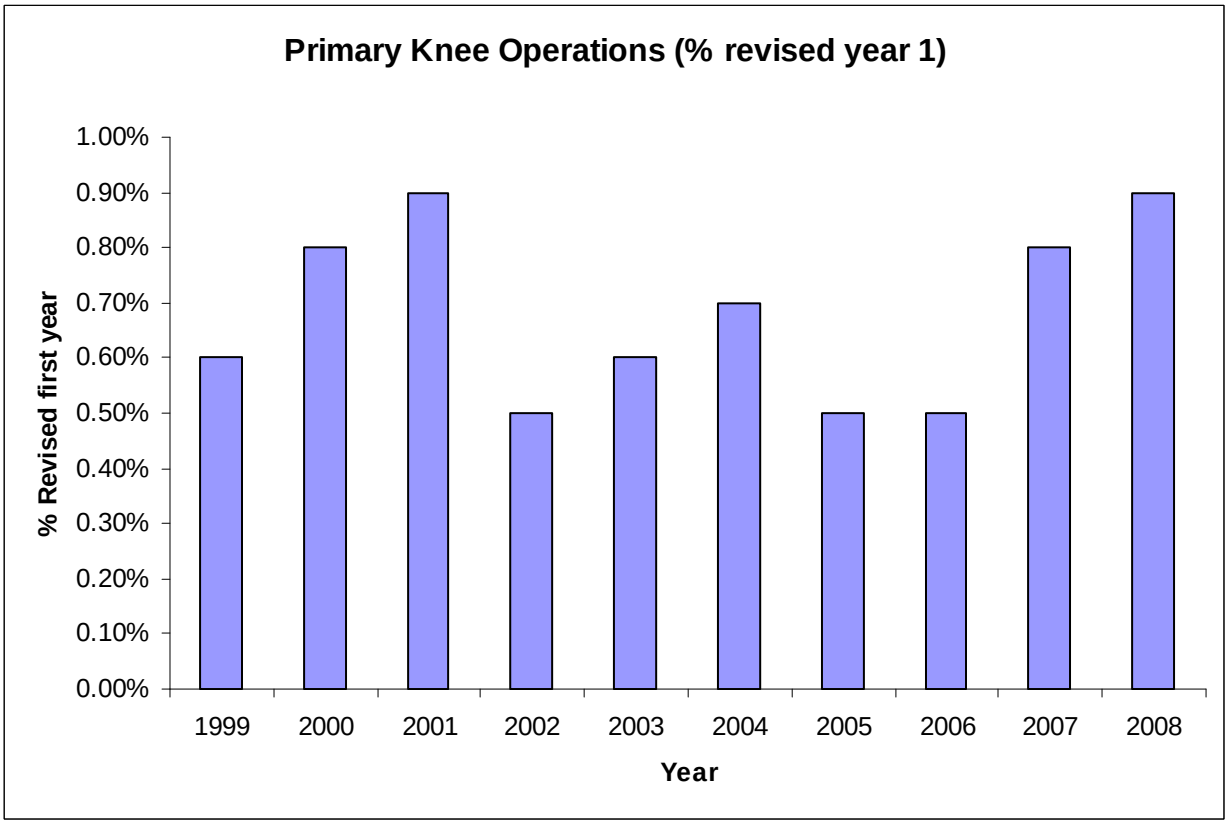


Furthermore there is a significant increase in revision rates when suits are used in either conventional or laminar flow theatres.

From the above data it would seem that, similar to hip arthroplasty, the use of space suits increases almost threefold the risk of deep infection within the first 6 months following the arthroplasty

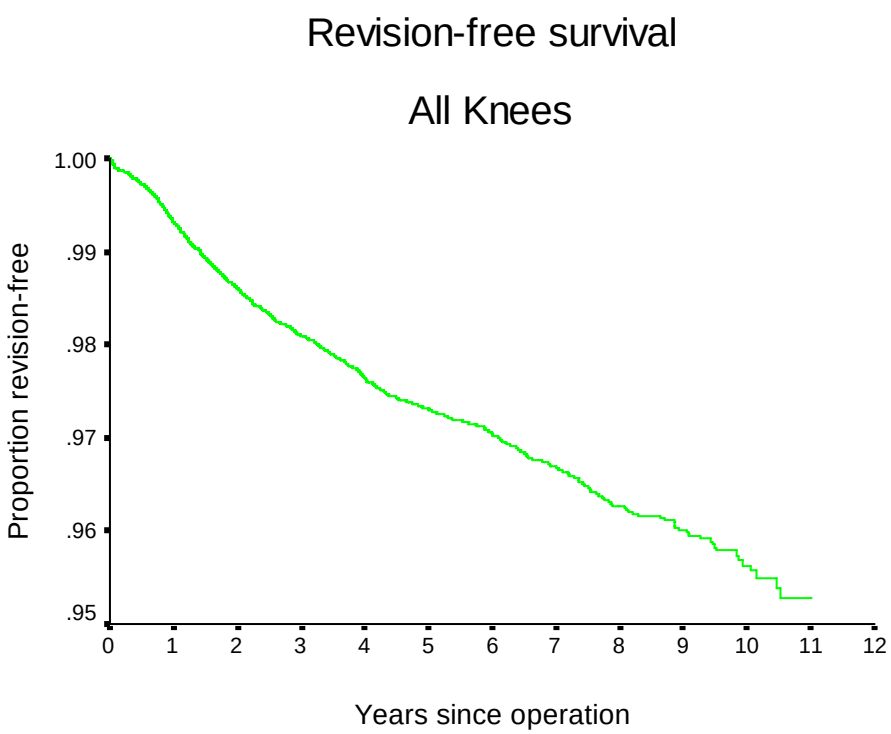
Percentage of knees revised in the first year



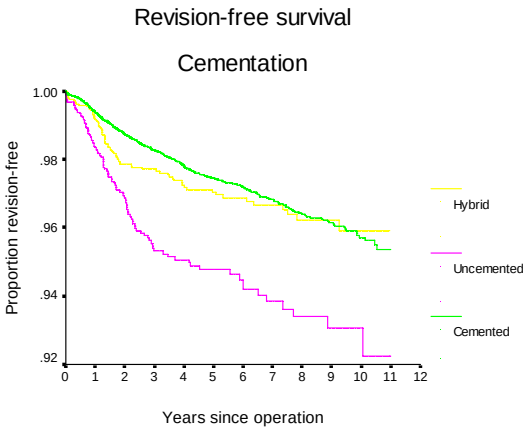


Kaplan Meier Curves

The following Kaplan Meier survival analyses are for years 1999 – 2009 with deceased patients censored at time of death.



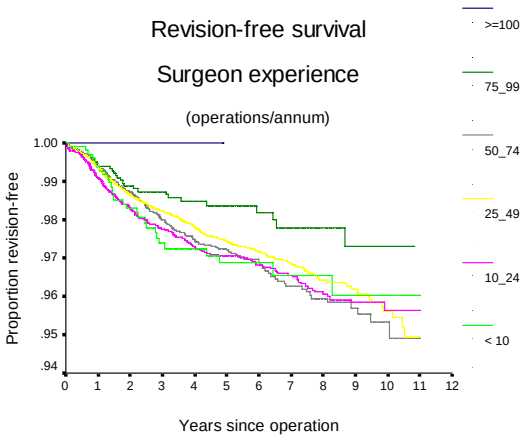
Years	% Revision-free
1	99.32
2	98.6
3	98.1
4	97.65
5	97.31
6	97.03
7	96.69
8	96.26
9	96.02
10	95.63

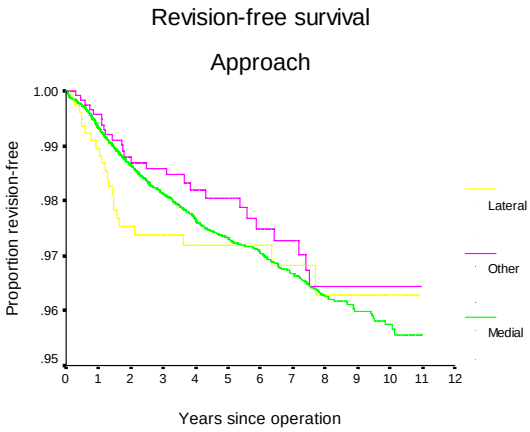


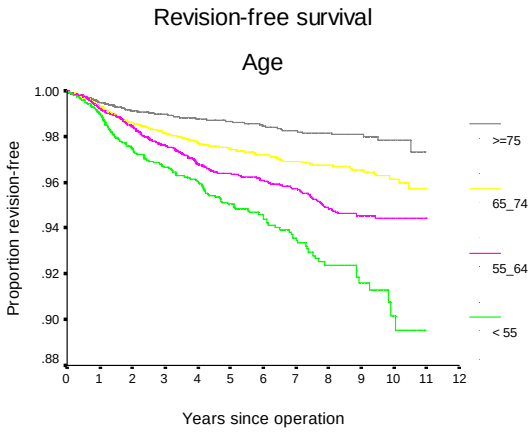
The KM analysis is to10yrs rather than 11as too few registered knees were revised in 2009

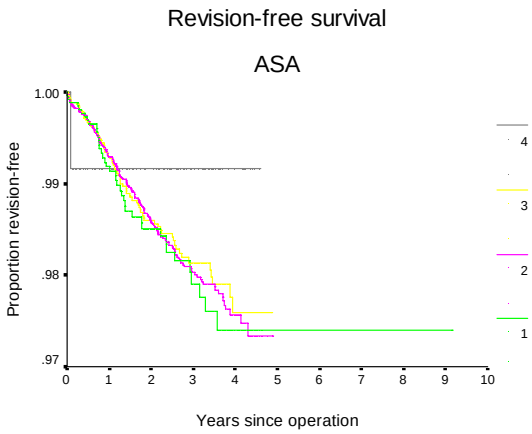
Survival at ten years

Cemented knees	95.72 %
Uncemented knees	93.07%
Hybrid knees	95.93%









Knee re-revisions
Analysis was undertaken of re-revisions.
There were 125 registered primary knee revisions that had been revised twice, 19 that had been revised 3 times and 2 had been revised 4 times.

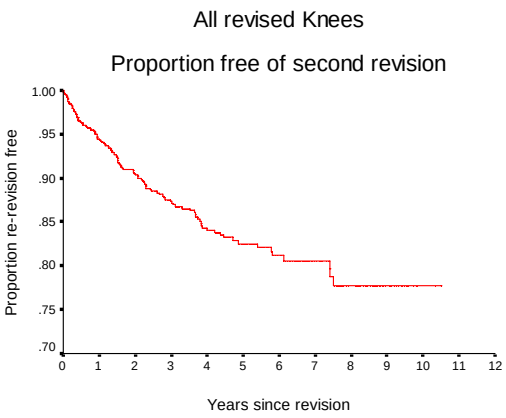
Second revision
Time between the first and second revision for the 125 knee arthroplasties averaged 655 days, with a range of 2 – 2746 and a standard deviation of 624 days.
This compares to an average of 919 days between primary and first revision arthroplasty.

Reason for revision

Deep infection	50
Pain	34
Loosening tibial component	25
Loosening femoral component	19
Instability	12
Dislocation	6
Stiffness	3
Patellar fracture	2
Loosening patellar component	2
Fracture femur	1
Other	10

Third revision
The average time between second and third revisions for the 19 knee arthroplasties was 494 days, with a range of 28 – 1277 and a standard deviation of 357 days.

Fourth revision
The average time between third and fourth revision for the 2 knee arthroplasties was 214 days.



The KM graph confirms that survival following the first revision is poorer than for primary arthroplasty.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTHS AND FIVE-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 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 eleven-year period and as at August 2010, there were 16,383 primary knee questionnaire responses registered at six months post surgery. The mean knee score was 37.05 (standard deviation 8.30, range 48 – 0)

Scoring > 41	5937
Scoring 34 – 41	5810
Scoring 27 – 33	2642
Scoring < 27	1994

At six months post surgery, 72% had an excellent or good score.

Questionnaires at five years post surgery

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

This dataset represents sequential Oxford knee scores for 4,561 individual patients.

At six months post surgery, 75% of these patients had an excellent or good score and had a mean of 37.80.

At five years post surgery, 82% of patients had an excellent or good score and had a mean of 39.75.

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 664 individual patients.

At six months post surgery, 73% of these patients had an excellent or good score and had a mean of 37.75.

At ten years post surgery, 77% of these patients had an excellent or good score and had a mean of 39.04.

Analysis of the individual questions at six months, five years and ten years post surgery
Percentage scoring 0 or 1(worst categories) for each question out of the group of 16,383 primary knee responses at six-months, 4,573 at five-years and 668 at ten-years.

		% 6/12	% 5 yrs	%10 yrs
1	Moderate or severe pain from the operated knee	14	9	9
2	Only able to walk around the house or unable to walk before pain becomes severe	6	4	3
3	Extreme difficulty or impossible to get in and out of a car or public transport	5	4	7
4	Extreme difficulty or impossible to kneel down and get up afterwards	43	41	44
5	Extreme difficulty or impossible to do the household shopping on your own	4	5	6
6	Extreme difficulty or impossible to wash and dry yourself	1	2	2
7	Pain interfering greatly or totally with your work	6	4	5
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	1
10	Limping most or every day	12	7	8
11	Extreme difficulty or impossible to walk down a flight of stairs	8	7	11
12	Pain from your knee in bed most or every nights	10	5	4

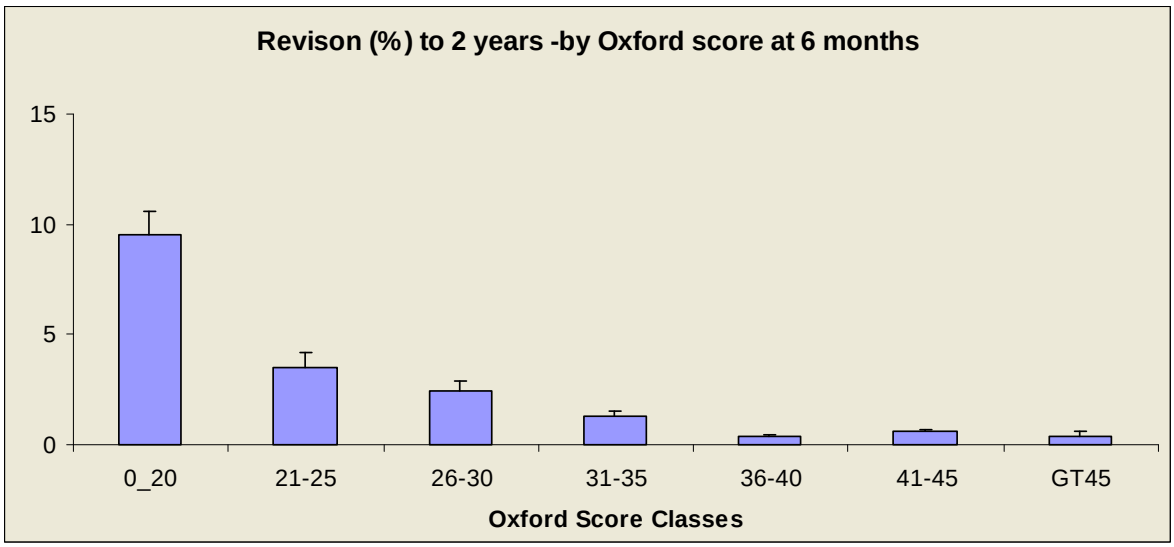
The percentage of people with kneeling difficulty remains high and overall the 10 yr outcomes affirm that the 6 month scores are indicative of the longer term outcome.

Revision knee questionnaire responses
There were 2,025 revision hip responses with 51% achieving an excellent or good score. This group includes all revision knee procedures. The mean revision hip score was 32.53 (standard deviation 10.17, range 48 – 3)

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

Six month score and revision arthroplasty
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.

By plotting the patients six month scores in groups of 5, except at the range extremes, against the proportion of knees revised for that same group it demonstrates that there is an incremental increase in risk during the first 2 years related to the oxford score. A patient with a score below 20 has 26 times the risk of a revision within 2 years compared to a person with a score 36 to 40



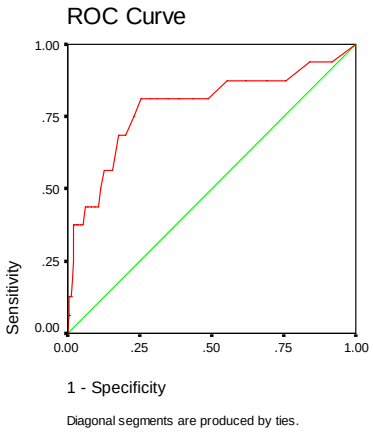
A person with an oxford score of 36 – 40 has a 0.37% risk of revision within two years compared to a 10% risk with a score of 20 or less

A ROC analysis has demonstrated that a patient with a score less than or equal to 32.5 has 8 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 67% of the revisions within 2 years from just the lowest 26% of Oxford scores.

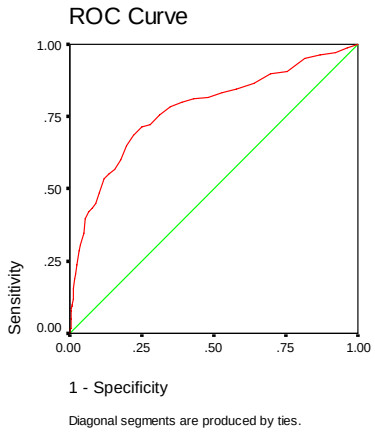
Five year score and revision arthroplasty

The ROC analysis at 5 years has demonstrated that a patient with a score less than or equal to 35.5 has 8 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 81% of the revisions within 2 years from just the lowest 26% of Oxford scores.

ROC curve at six months versus revision within two years



ROC curve at five years versus revision within two years



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.

UNI COMPARTMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **ten**-year report analyses data for the period January 2000 – December 2009. There were 5,450 unicompartmental knee procedures registered, an additional 623 compared to last year's report.

2000	340
2001	430
2002	533
2003	634
2004	634
2005	558
2006	584
2007	575
2008	539
2009	623

There was a 16% increase in registrations in 2009, the first annual increase since 2006.

DATA ANALYSIS

Age and sex distribution

The average age for a unicompartmental knee replacement was 66.48 years, with a range of 33.05 – 94.71 years.

	Female	Male
Number	2574	2876
Percentage	47.23	52.77
Mean age	66.39	66.56
Maximum age	94.71	93.42
Minimum age	33.05	35.24
Standard dev.	10.16	8.96

Previous operation

None	4295
Menisectomy	852
Arthroscopy/debridement	263
Internal fixation	23
Osteotomy	21
Ligament reconstruction	21
Arthrotomy	3
Synovectomy	2
Other	12

Diagnosis

Osteoarthritis	5301
Avascular necrosis	47
Post ligament disruption	23
Other inflammatory	18
Rheumatoid arthritis	13
Post fracture	12
Tumour	1
Other	10

Approach

Medial	4292
Minimally invasive surgery	1187
Other	185
Lateral	122
Image guided surgery	9

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

The minimally invasive approach continues to be popular and in 2009 was used in 34% of arthroplasties.

Cement

Femur cemented	4884	90%
Antibiotic in cement	2929	60%
Tibia cemented	4928	90%
Antibiotic in cement	2956	60%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	5236	96%

Operating theatre

Conventional	3996
Laminar flow	1377
Space suits	1342

In 2009, 41% of unicompartmental knees were performed in laminar flow theatres and space suits were used in 38%.

ASA Class

This was introduced with the updated forms at the beginning of 2005.
For the five year period 2005 – 2009, there were 2,605 (91%) 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	479	18
2	1705	65
3	411	16
4	10	1

Operative time (skin to skin)

Mean	80 minutes
Standard deviation	24 minutes
Minimum	24 minutes
Maximum	195 minutes

Surgeon grade

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

The following figures are for the five- year period 2005 – 2009.

Consultant	2701
Advanced trainee supervised	151
Advanced trainee unsupervised	11
Basic trainee	8

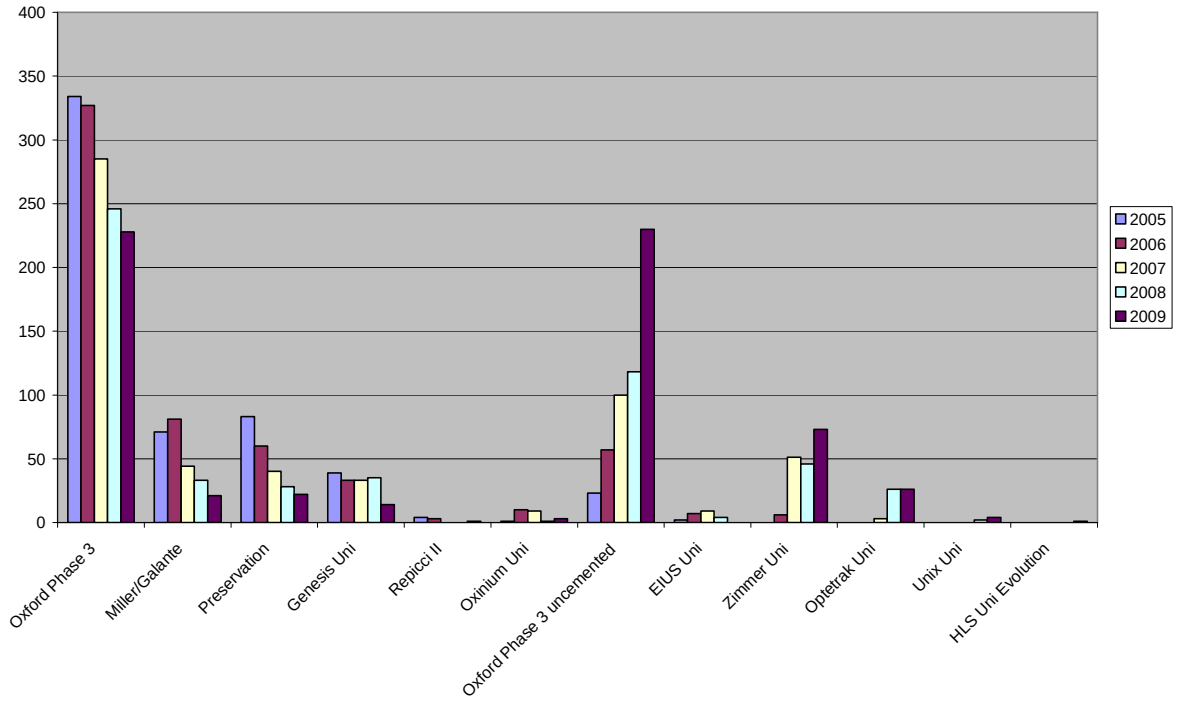
Prosthesis usage

Unicompartmental knee prostheses used in 2009

Oxford Phase 3 uncemented	230
Oxford Phase 3	228
Zimmer Uni	73
Optetrak Uni	26
Preservation	22
Miller/Galante	21
Genesis Uni	14
Unix Uni	4
Oxinium Uni	3
Repicci II	1
HLS Uni Evolution	1

The Oxford uncemented doubled its number of registrations in 2009 compared to 2008.

Most used unicompartmental prostheses 2005 - 2009



The gains of the Oxford uncemented and Zimmer uni during 2009 were at the expense of most of the others.

Surgeon and hospital workload

Surgeons
In 2009, 75 surgeons performed 623 unicompartmental knee replacements, an average of 8 procedures per surgeon.
35 surgeons performed less than 5 procedures and 8 performed more than 15 procedures.

Hospitals
In 2009 unicompartmental knee replacement was performed in 37 hospitals. 18 were public and 19 were private.
For 2009 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 ten-year period.

There were 334 revisions of the 5,450 registered unicompartmental knee replacements (6.13%) with 50 of those revised in 2009.

A further 24 (including any revised to a total knee replacement) had a second revision and 3 a third revision.

293 of the 334 (88%) were revised to total knee replacements. 41 (12%) were revised to further unicompartmental replacements

Time to revision

Mean	933 days
Maximum	3290 days
Minimum	10 days
Standard deviation	731 days

Reason for revision

Pain	144
Loosening tibial component	79
Loosening femoral component	53
Progression of disease	27
Bearing dislocation	23
Deep infection	15
Fracture tibia	14
Fracture femur	1
Other	23

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

Analysis by time of the 3 main reasons for revision

Pain n = 144

< 6 months	7
6 months – 1 year	22
2 years	49
3 years	24
4 years	10
5 years	14
6 years	9
7 years	4
8 years	4
9 years	1
10 years	0

Loosening tibial component n = 79

< 6 months	8
6 months – 1 year	15
2 years	27
3 years	6
4 years	7
5 years	7
6 years	4
7 years	3
8 years	2
9 years	0
10 years	0

Loosening femoral component n = 53

< 6 months	0
6 months – 1 year	11
2 years	16
3 years	6
4 years	10
5 years	2
6 years	2
7 years	2
8 years	3
9 years	1
10 years	0

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.This method utilises the total number of protheses years in the Registry for calculating the revision rates. These rates are usually very low, hence they 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

All patients	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
	5450	23408.72	334	1.43	1.28	1.59

Revision rate of individual unicompartmental knee prostheses

Prosthesis	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
EIUS Uni Knee	22	61	0	0	0	5.97
Genesis Uni	317	1384	23	1.66	1.05	2.49
HLS Uni Evolution	1	0	1	193.42	4.90	1077.69
LCS Uni	6	42	2	4.719	0.57	17.05
Miller/Galante	641	3339	33	0.99	0.68	1.39
Optetrak Unicondylar Cemented	55	61	0	0	0	6.04
Oxford Phase 3	3095	14649	211	1.44	1.25	1.65
Oxford Phase 3 uncemented	529	817	5	0.61	0.20	1.43
Oxinium Uni	33	9504	9	9.47	4.33	17.98
Preservation	472	2025	38	1.88	1.33	2.58
Repicci II	97	685	9	1.31	0.60	2.49
Unix Uni	6	3	0	0	0	95.69
Zimmer Unicompartmental Knee	176	242	3	1.24	0.26	3.62

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.

Revision vs Arthroplasty Fixation

Operation Type	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Cemented	4874	22385	325	1.45	1.30	1.62
Uncemented	512	886	8	0.90	0.39	1.78
Hybrid	64	136	1	0.73	0.02	4.07

Although the uncemented and hybrid unis appear to have significantly lower revision rates than cemented unis they are not statistically significant in view of the small number of ocys

Revision vs Age Bands

Age Bands	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
LT55	645	2769	56	2.02	1.53	2.63
55_64	1845	7924	143	1.80	1.52	2.13
65_74	1844	8094	90	1.11	0.89	1.37
GE75	1116	4619	45	0.97	0.71	1.30

There are significantly higher revision rates for the <55 and 55-64 age bands when compared to the 65-74 & >75 age bands

Revision vs Gender

Gender	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
M	2574	11100	168	1.51	1.29	1.76
F	2876	12307	166	1.35	1.15	1.57

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

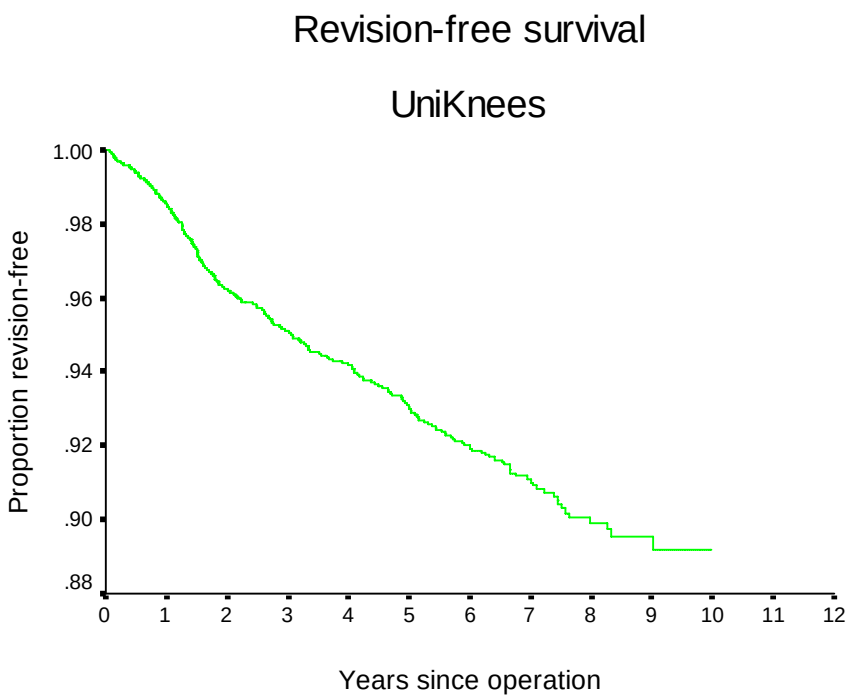
Revision vs Surgeon annual workload

Number/year	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
<10	2856	12513	206	1.65	1.43	1.89
>=10	2578	10839	125	1.15	0.96	1.37

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

Kaplan Meier Curves

The following Kaplan Meier survival analyses are for years 2000 to 2009 with deceased patients censored at time of death.



Years	% Revision-free
1	98.48
2	96.24
3	95.09
4	94.16
5	93.03
6	91.94
7	91.10
8	89.90

Numbers too few for accurate percentage survival beyond 8 years.

Revision rate for re-revisions

Re-Revisions	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Revised to full	293	934.41	17	1.82	1.06	2.91
Revised to Uni	41	148.4	7	4.72	1.90	9.72

When compared to the primary total knee arthroplasty revision rate of 0.53 (C.I. 0.50, 0.56), 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.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTH 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 ten year period and as at August 2010, there were 3,791 unicompartmental knee questionnaire responses registered at six months post surgery (70% of total).
The mean unicompartmental knee score was 38.99 (standard deviation 7.49, range 3 – 48)

Scoring > 41	1784
Scoring 34 - 41	1241
Scoring 27 - 33	487
Scoring < 27	279

At six months post surgery, 80% had an excellent or good score.

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

This dataset represents sequential Oxford knee scores for individual patients.

The number of patients with six-month and five-year scores was 907.

At six months post surgery, 83% of this group of patients had an excellent or good score and had a mean of 39.50.

At five years post surgery, 87 % of these patients had an excellent or good score and had a mean of 41.03.

Analysis of the individual questions at six months and five 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 for each question out of the group of 3,791 at six-month post surgery and 907 at five-years.

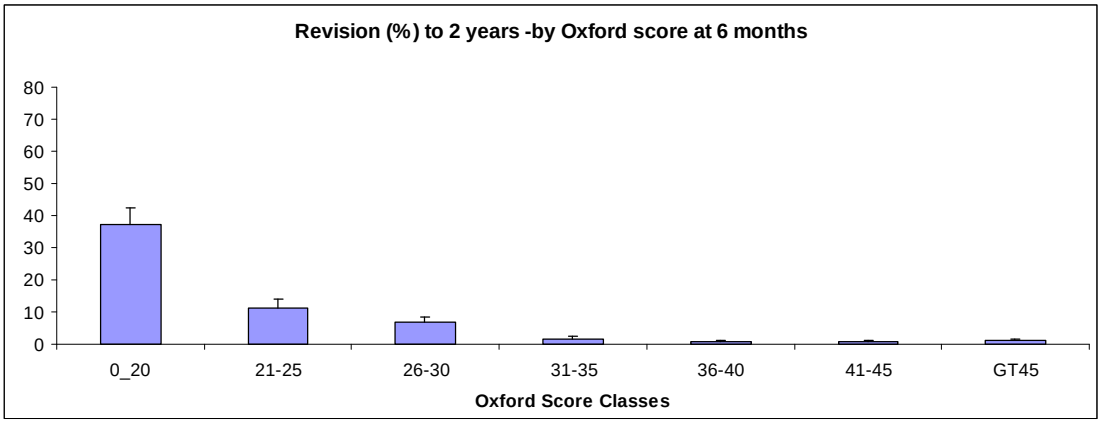
		% 6/12	% 5 yrs
1	Moderate or severe pain from the operated knee	11	9
2	Only able to walk around the house or unable to walk before pain becomes severe	3	2
3	Extreme difficulty or impossible to get in and out of a car or public transport	2	1
4	Extreme difficulty or impossible to kneel down and get up afterwards	32	29
5	Extreme difficulty or impossible to do the household shopping on your own	2	2
6	Extreme difficulty or impossible to wash and dry yourself	0.5	0.3
7	Pain interfering greatly or totally with your work	3	3
8	Very painful or unbearable to stand up from a chair after a meal	3	2
9	Most of the time or always feeling that the knee might suddenly “give way"	2	1
10	Limping most or every day	9	6
11	Extreme difficulty or impossible to walk down a flight of stairs	4	3
12	Pain from your knee in bed most or every nights	6	4

As noted in previous years there is little significant change between the six-month and five-year scores which affirms that the six-month score is indicative of the medium term outcome.

OXFORD 12 SCORE AS A PREDICTOR OF KNEE ARTHROPLASTY REVISION

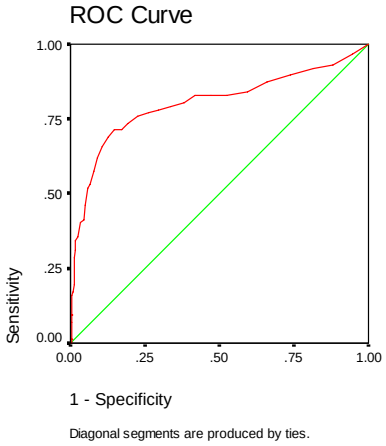
A statistically significant relationship has been confirmed between the Oxford scores at 6 months and arthroplasty revision within two years of the Oxford 12 questionnaire date.

By plotting the patients scores in groups of 5, except at the range extremes, against the proportion of unicompartmental knees revised for that same group it demonstrates that there is an incremental increase in risk during the first 2 years related to the Oxford score. A patient with a score below 20 has 46 times the risk of a revision within 2 years compared to a person with a score 36-40



A person with an oxford score of 36 – 40 has a 0.8% risk of revision within two years compared to a 37% risk with a score of 20 or less.

A ROC analysis has demonstrated that a patient with a score less than or equal to 31.5 has 13 times the risk of needing a revision within 2 years compared to a person with a score greater than 31.5.
Alternatively the ROC analysis predicted 71% of the revisions within 2 years from just the lowest 16% of Oxford scores.



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.

ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **ten**- year report analyses data for the period January 2000 – December 2009. There were 603 primary ankle procedures registered, an additional 119 compared to last year's report.

2000	17
2001	28
2002	28
2003	26
2004	48
2005	70
2006	81
2007	79
2008	107
2009	119

In 2009 there was an 11% increase in ankle arthroplasty registrations compared to the 35% increase in 2008

DATA ANALYSIS

Age and sex distribution

The average age for an ankle replacement was 65.04 years, with a range of 32.32 – 88.38 years.

	Female	Male
Number	235	368
Percentage	38.97	61.03
Mean age	63.17	66.24
Maximum age	85.84	88.38
Minimum age	32.32	35.62
Standard dev.	9.76	8.44

Previous operation

None	470
Internal fixation for juxtarticular Fracture	66
Arthroscopy/debridement	24
Arthrodesis	21
Osteotomy	11
Reconstruction/repair	5
Other	6

Diagnosis

Osteoarthritis	430
Post trauma	110
Rheumatoid arthritis	64
Other inflammatory	6
Avascular necrosis	1
Other	9

Approach

Anterior	524
Anterolateral	29
Other	7

Bone graft

Tibia autograft	31
Tibia allograft	2
Talus autograft	6
Talus allograft	2

Cement

Tibia cemented	11
Antibiotic in cement	7
Talus cemented	6
Antibiotic in cement	3

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 573 (95%)

Operating theatre

Conventional	331
Laminar flow	266
Space suits	97

ASA Class

This was introduced with the updated forms at the beginning of 2005.
For the five-year period 2005 -2009, there were 372 (62%) 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	82
2	224
3	64
4	2

Operative time (skin to skin)

Mean	125	minutes
Standard deviation	37	minutes
Minimum	30	minutes
Maximum	290	minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the five-year period 2005 - 2009.

Consultant	456
Advanced trainee supervised	4

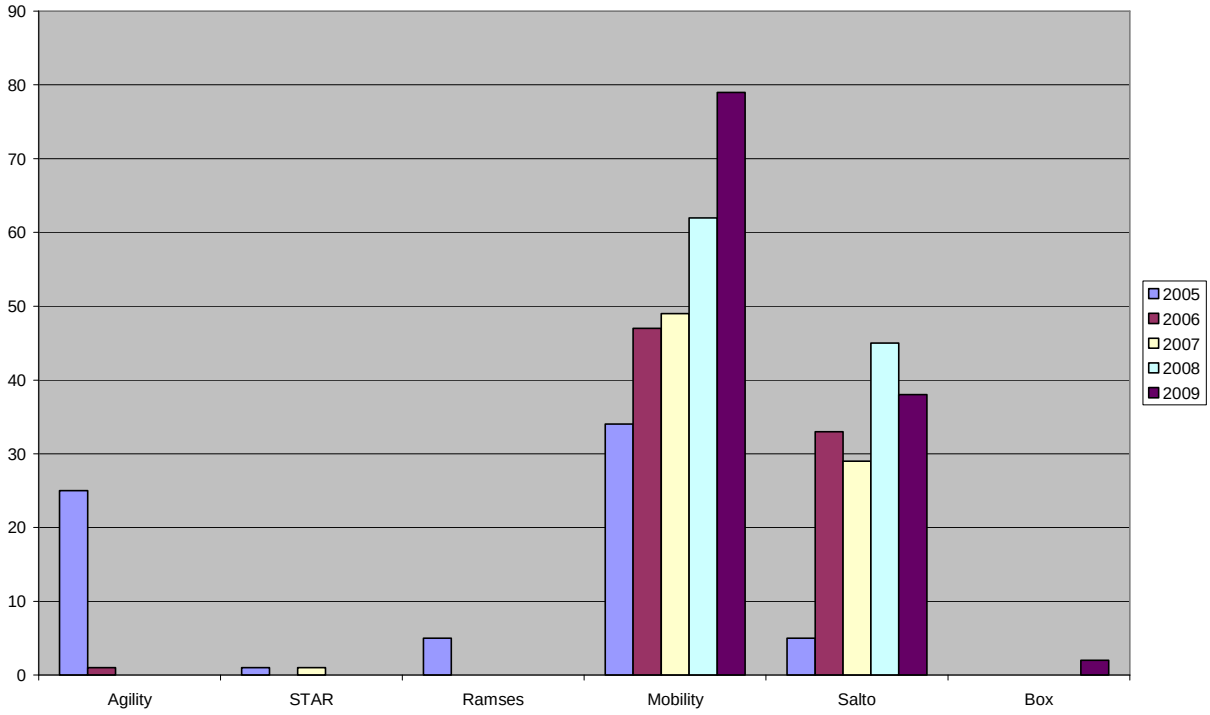
Prosthesis usage

Ankle prostheses used in 2009

Mobility	79
Salto	38
Box	2

The Mobility remains the dominant prosthesis. The Box appears for the first time.

MOST USED ANKLE PROSTHESES 2005 – 2009



Surgeon and hospital workload

Surgeons

In 2009, 15 surgeons performed 119 primary ankle procedures, an average of 8 procedures per surgeon. 3 surgeons performed more than 20 procedures and 3 performed 1 procedure.

Hospitals

In 2009 primary ankle replacement was performed in 29 hospitals. 15 were public and 14 were private.

REVISION ANKLE ARTHROPLASTY

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

Data analysis

For the ten-year period January 2000– December 2009, there were 38 revision ankle procedures registered.
The average age for an ankle revision was 64.86 years, with a range of 42.15 – 78.98.

	Female	Male
Number	12	26
Percentage	31.58	68.42
Mean	63.08	65.69
Maximum age	78.98	76.56
Minimum age	42.15	49.04
Standard dev.	11.98	7.21

REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTIES

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

There were 25 revisions of the primary group of 603 (4.15%) and 2 re-revisions.

Time to revision

Mean	1102 days
Maximum	2497 days
Minimum	21 days
Standard deviation	711 days

Reason for revision

Loosening talar component	12
Pain	12
Loosening tibial component	4
Deep infection	2
Other	5

Analysis by time of the 2 main reasons for revision

Loosening talar component n = 12

< 6 months	1
3 years	1
4 years	3
5 years	3
6 years	3
7 years	1

Pain n = 12

6 months – 1 year	1
2 years	5
4 years	2
5years	3
6 years	1

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.This method utilises the total number of protheses years in the Registry for calculating the revision rates. These rates are usually very low, hence they 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 ankle arthroplasties

	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
All patients	603	1897.48	25	1.32	0.85	1.94

Revision vs prosthesis type

Prosthesis	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Agility Tibial Shell	119	723.69	10	1.38	0.66	2.54
Box	2	0.81	0			
Mobility	274	557.05	7	1.26	0.51	2.59
Ramses	11	51.46	1	1.94	0.05	10.83
Salto	150	292.42	0	0	0	1.26
Scandinavian Total Ankle Repl.	47	272.04	7	2.57	1.03	5.30

There is no statistically significant difference in the revision rates among the prostheses

Revision vs gender

Gender						
Females	235	738.03	7	0.95	0.38	1.95
Males	368	1159.45	18	1.55	0.92	2.45

Although there appears to be a higher revision rate for males, this is not statistically significant

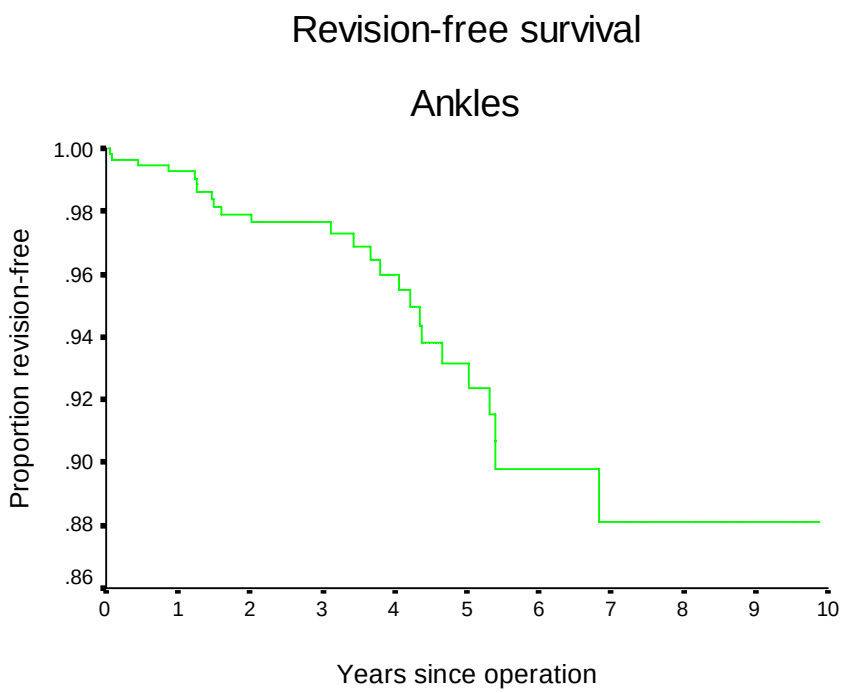
Revision vs age bands

Age Bands						
LT55	72	254.27	4	1.57	0.43	4.03
55_64	224	717.94	10	1.39	0.67	2.56
65_74	223	696.66	10	1.44	0.69	2.64
GE75	84	228.61	1	0.44	0.01	2.44

There is no significant difference in the revision rates among the age groups

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the 10 years, 2000 to 2009 with deceased patients censored at time of death



Years	% Revision-free
1	99.28
2	97.91
3	97.64
4	95.98
5	93.14
6	89.79
7	88.13

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

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTH POST SURGERY

At six-month post surgery patients are sent a questionnaire which is modelled on the Oxford -12 questionnaire but is not validated. The same scoring system has been adopted as recommended by the original authors of the Oxford 12 hip and knee questionnaires

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

We have grouped the questionnaire responses based on the scoring 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 ten year period and as at August 2010, there were 483 primary ankle questionnaire responses registered six months post surgery.
The mean primary ankle score was 33.34 (standard deviation 9.66, range 2 – 48)

Scoring > 41	116
Scoring 34 - 41	152
Scoring 27 - 33	97
Scoring < 27	118

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

There were insufficient 5 year questionnaire responses for analyses

Analysis of the individual questions
Analysis of the individual questions showed that the main concerns at 6 months were pain(Q1& 9), limping (Q6) and swelling of the foot (Q10).

Percentage scoring 0 or 1 for each question (483)

		6/12 %
1	Moderate or severe pain from the operated ankle	22
2	Only able to walk around the house or unable to walk before the pain becomes severe	7
3	Extreme difficulty or impossible to walk on uneven ground	14
4	Most of the time or always have to use an orthotic	24
5	Pain greatly or totally interferes with usual work	17
6	Limping most or every day	35
7	Extreme difficulty or impossible to climb a flight of stairs	6
8	Pain from your ankle in bed most or every nights	6
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 17 revision ankle responses with only 6 achieving an excellent or good score. This group includes all revision ankle responses. The mean revision ankle score was 28.47 (standard deviation 12.72, range 8 – 48).

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **ten**-year report analyses data for the period January 2000 – December 2009. There were 3010 primary shoulder procedures registered, an additional 512 compared to last year's report.

2000	122
2001	162
2002	193
2003	225
2004	280
2005	293
2006	366
2007	400
2008	457
2009	512

There was a 12 % increase in registrations for 2009, similar to last year.

This year the resurfacing shoulder replacements are divided into total and partial resurfacing. The total resurfacing shoulder replacements have, in addition to the resurfaced humeral head, a replaced glenoid. Prior to 2009, a small number of total resurfacing replacements had been classified as total shoulder arthroplasties.

From the 3010 shoulder registrations, 1167(39%) are hemi shoulder replacements, 1164(39%) are conventional total shoulder replacements, 550(18%) are reverse shoulder replacements, 109(3.6%) are partial resurfacing shoulder replacements and 20(0.6%) are total resurfacing replacements.

DATA ANALYSIS

Age and sex distribution

The average age for all patients with a shoulder arthroplasty was 70.17 years, with a range of 15.63 – 97.71 years.

All shoulder arthroplasty

	Female	Male
Number	1949	1061
Percentage	64.75	35.25
Mean age	71.84	67.12
Maximum age	97.71	90.48
Minimum age	15.63	21.83
Standard dev.	10.11	10.76

Hemiarthroplasty

	Female	Male
Number	787	380
Percentage	67.44	32.56
Mean age	71.34	65.84
Maximum age	97.71	90.48
Minimum age	15.63	27.81
Standard dev.	10.95	12.05

Conventional total shoulder arthroplasty

	Female	Male
Number	761	403
Percentage	65.38	34.62
Mean age	70.99	67.67
Maximum age	94.62	85.72
Minimum age	26.64	29.38
Standard dev.	9.28	8.04

Reverse shoulder arthroplasty

	Female	Male
Number	354	196
Percentage	64.36	35.64
Mean age	76.09	73.19
Maximum age	91.60	88.17
Minimum age	40.70	49.41
Standard dev.	7.25	7.86

Partial Resurfacing arthroplasty

	Female	Male
Number	35	74
Percentage	32.11	67.89
Mean age	58.70	54.63
Maximum age	87.06	79.37
Minimum age	20.70	21.83
Standard dev.	13.99	11.51

Total resurfacing arthroplasty

	Female	Male
Number	12	8
Percentage	60.00	40.00
Mean age	71.42	67.32
Maximum age	85.71	76.03
Minimum age	53.18	55.04
Standard dev.	9.12	7.71

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	2567
Rotator cuff repair	106
Internal fixation for juxtarticular fracture	77
Previous stabilisation	62
Arthroscopy/debridement	46
Acromioplasty	43
Subacromial decompression	6
Other	22

Diagnosis

Osteoarthritis	1621
Cuff tear arthropathy	410
Acute fracture prox. humerus	327
Rheumatoid arthritis	310
Post old trauma	230
Avascular necrosis	105
Post recurrent dislocation	38
Other inflammatory	33
Tumour	16
Other	31

Approach

Deltopectoral	2693
Deltoid split	65
Other	13

Bone graft

Humeral autograft	67
Humeral allograft	14
Humeral synthetic	3
Glenoid autograft	19
Glenoid allograft	5

Cement

Humerus cemented	1049	(36%)
Antibiotic in cement	599	(57%)
Glenoid cemented	857	(49%)
Antibiotic in cement	560	(65%)

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	2811	(93%)

Operating theatre

Conventional	1949
Laminar flow	1028
Space suits	411

ASA Class

This was introduced with the updated forms at the beginning of 2005.
For the five-year period 2005 – 2009 there were 1837 (91%) 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	194	10
2	1001	55
3	623	34
4	19	1

Operative time (skin to skin in minutes)

	Mean	Min	Max	StDev
Hemi	106	30	360	36
Total Sh.	130	53	270	33
Partial R.	96	44	285	40
Total R.	137	91	190	28
Reverse	117	39	246	29

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the five-year period 2005 – 2009.

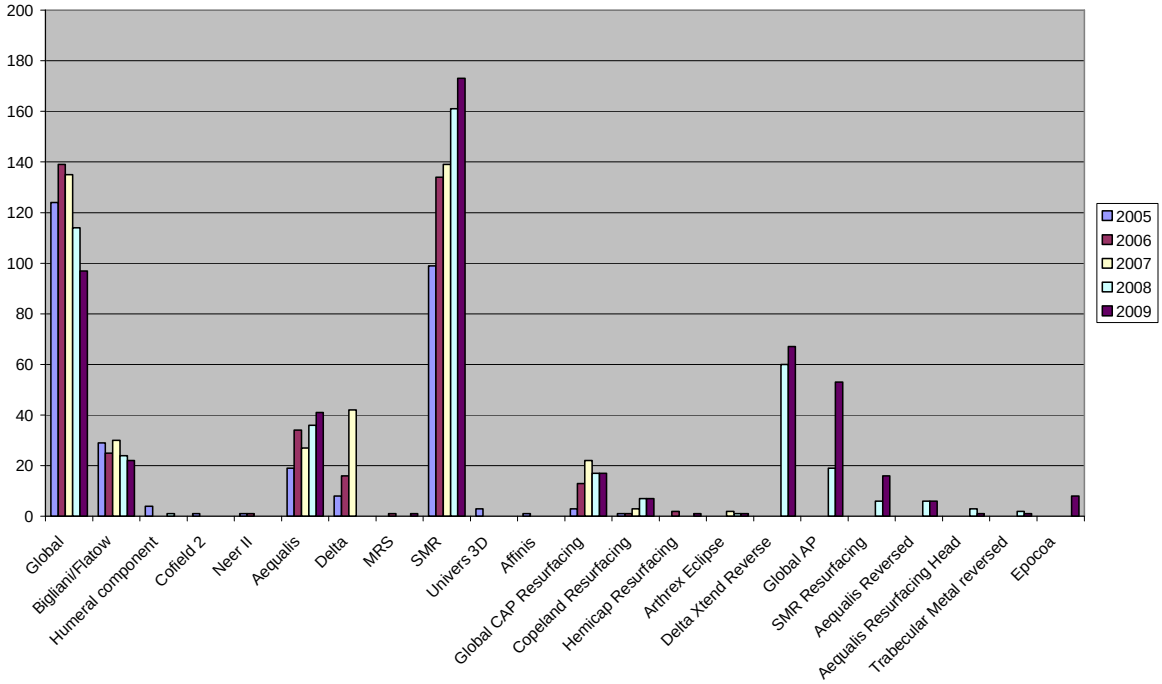
Consultant	1947
Advanced trainee supervised	79
Advanced trainee unsupervised	4
Basic trainee	1

Prosthesis usage

Shoulder prostheses used in 2009.

SMR	173
Global	97
Delta Xtend Reverse	67
Global AP	53
Aequalis	41
Bigliani/Flatow	22
Global CAP Resurfacing	17
SMR Resurfacing	16
Epocoa	8
Copeland Resurfacing	7
Aequalis Reversed	6
Aequalis Resurfacing Head	1
Trabecular Metal Reverse	1
Arthrex Eclipse	1
Hemicap Resurfacing	1
MRS	1

There has been no significant change among the more popular prostheses.



Surgeon and hospital workload

Surgeons
In 2009, 68 surgeons performed 512 shoulder procedures, an average of 8 procedures per surgeon. 2 surgeons performed more than 30 procedures and 17 surgeons performed 1 procedure.

Hospitals
In 2009, shoulder replacement was performed in 47 hospitals. 25 were public and 22 were private.
For 2009 the average number of shoulder replacements per hospital was 11.

	Female	Male
Number	125	88
Percentage	58.69	41.31
Mean	69.71	64.73
Maximum age	89.68	81.86
Minimum age	33.89	24.05
Standard dev.	11.94	11.51

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 arthrodesis, excision arthroplasty or amputation, but not soft tissue procedures. A two or more staged procedure is registered as one revision.

Data analysis
For the ten-year period January 2000 – December 2009, there were 213 revision shoulder procedures registered. This is an additional 33 compared to last year's report.
The average age for a shoulder revision was 67.65 years with a range of 24.05 – 89.68 years.

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTIES

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

There were 98 revisions of the primary group of 3010 (3.26%). There were 9 procedures that had been revised twice and 1 that had been revised 3 times.

Time to revision

Mean	622	days
Maximum	3296	days
Minimum	0	days
Standard deviation	646	days

Reason for revision

Pain	32
Dislocation/instability anterior	21
Loosening glenoid	14
Deep infection	10
Wear glenoid	9
Subacromial cuff impingement	5
Cuff failure	4
Instability posterior	4
Fracture humerus	1
Loosening humeral	1
Subacromial tuberosity imping.	1
Other	10

Analysis by time for the 4 main reasons for revision

Pain n = 32

< 6 months	1
6 months – 1 year	6
2 years	11
3 years	6
4 years	2
5 years	4
6 years	0
7 years	1
8 years	0
9 years	1

Dislocation n = 21

< 6 months	14
6 months – 1 year	3
2 years	4

Loosening glenoid n = 14

< 6 months	4
6 months – 1 year	1
2 years	4
3 years	2
4 years	1
5 years	1
6 years	0
7 years	0
8 years	0
9 years	0
10 years	1

Deep infection n = 10

< 6 months	2
6 months – 1 year	2
2 years	3
3 years	3

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.This method utilises the total number of protheses years in the Registry for calculating the revision rates. These rates are usually very low, hence they 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

	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
All patients	3010	104	98	0.94	0.77	1.15

Revision rate of individual shoulder prostheses

Operation type	Prosthesis	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Conventional Total	Aequalis	146	499.94	3	0.60	0.12	1.75
	Affinis	1	4.18	0	0	0	88.30
	Anatomical	8	52.59	0	0	0	7.01
	Bi-Angular	8	44.94	0	0	0	8.21
	Bigliani/Flatow	190	883.18	2	0.23	0.03	0.82
	Cofield 2	21	149.47	0	0	0	2.47
	Epoca Humeral stem	2	0.88	0	0	0	421.11
	Global	349	1172.90	5	0.43	0.14	0.99
	Global AP	57	38.59	0	0	0	9.56
	Global Stem	1	0.61	0	0	0	603.74
	Humeral component	49	291.87	2	0.69	0.08	2.48
	Humeral stem	27	186.80	0	0	0	1.97
	Neer 3	2	16.2	0	0	0	22.77
	Neer II	12	95.29	0	0	0	3.87
	SMR	286	611.84	11	1.80	0.90	3.22
	Univers 3D	5	20.17	0	0	0	18.29
Reverse	Aequalis Reversed	17	25.68	0	0	0	14.37
	Delta	55	244.61	1	0.41	0.01	2.28
	Delta Xtend Reverse	157	183.05	4	2.19	0.60	5.59
	SMR	319	776.99	16	2.06	1.18	3.34
	Trabecular Metal Reverse	2	2.35	0	0	0	157.24
Hemi	Aequalis	87	350.64	6	1.71	0.63	3.72
	Anatomical	5	36.65	0	0	0	10.07
	Arthrex Eclipse	2	2.20	0	0	0	167.60
	Bi-Angular	19	141.62	2	1.41	0.17	5.10
	Bigliani/Flatow	119	619.60	8	1.29	0.56	2.54
	Bio-modular	1	7.14	1	14.01	0.35	78.03
	Cofield 2	50	345.96	0	0	0	1.07
	Delta	1	3.28	0	0	0	112.57
	Delta Xtend Reverse	5	6.63	0	0	0	55.61
	Global	610	2414.22	24	0.99	0.64	1.48
	Global AP	15	10.22	1	9.79	0	54.53
	Humeral component	43	264.28	1	0.38	0.01	2.11
	Humeral stem	14	96.39	0	0	0	3.83
	MRS Humeral	4	9.94	0	0	0	37.10

	Neer II	24	150.64	0	0	0	2.45
	Randelli	1	7.40	0	0	0	49.88
	SMR	165	402.22	7	1.74	0.70	3.59
	Trabecular Metal Reverse	1	0.23	0	0	0	1583.21
	Univers 3D	1	3.82	0	0	0	96.59
Total Resurfacing	Aequalis Resurfacing Head	4	4.38	0	0	0	84.26
	Epoca Head	5	1.32	0	0	0	280.10
	Global CAP Resurfacing	11	12.69	0	0	0	29.06
Partial resurfacing	Copeland Resurfacing	19	26.16	1	3.82	0.10	21.30
	Eclipse	2	4.16	1	24.02	0.61	133.80
	Epoca Head	1	0.44	0	0	0	842.21
	Global CAP Resurfacing	61	133.99	2	1.49	0.18	5.39
	Hemicap Resurfacing	3	7.12	0	0	0	51.80
	SMR Resurfacing	18	16.42	0	0	0	22.46
	SMR Resurfacing CTA	5	4.30	0	0	0	85.77

The SMR Reverse has a significantly higher revision rate compared to the overall mean of 0.94/100 ocys @ the 95% confidence interval. Although there appear to be some other prostheses with comparatively higher revision rates none are statistically significant owing to wide CIs

Revision vs Operation Category

Operation Category	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
ConventionalTotal	1164	4069.44	23	0.57	0.36	0.85
Reverse	550	1232.67	21	1.70	1.05	2.60
Hemis	1167	4873.04	50	1.03	0.76	1.35
Total Resurfacing	20	18.39	0	0	0	20.06
Part. Resurfacing	109	192.59	4	2.08	0.57	5.32

The Reverse shoulder procedures have a significantly higher revision rate than conventional total arthroplasty.

Cemented vs uncemented glenoids

	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Cemented	842	3341.88	14	0.42	0.22	0.70
Uncemented	322	727.57	9	1.24	0.57	2.35

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

Revision vs Age Bands

Age Bands	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
LT55	241	853.02	19	2.23	1.34	3.48
55_64	571	2002.13	22	1.099	0.69	1.66
65_74	1094	3822.20	34	0.89	0.62	1.24
GE75	1104	3708.78	23	0.62	0.39	0.93

The <55 age band have a significantly increased revision rate compared to the older two.

Revision vs Gender

Gender	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Female	1949	6871.81	58	0.84	0.64	1.09
Male	1061	3514.32	40	1.14	0.81	1.55

There is no significant difference between the two groups.

Revision vs Surgeon annual workload

Consultant Number of ops/ Total yr	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
<10	1555	5591.57	56	1.00	0.76	1.30
>=10	1455	4794.56	42	0.87	0.63	1.18

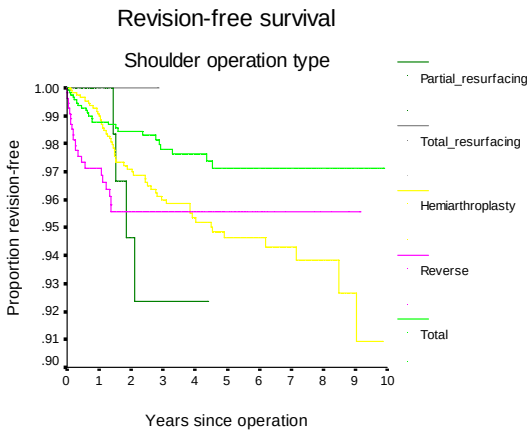
There is no significant difference between the two groups

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for the years 2000 – 2009 with deceased patients censored at time of death.

Years	% Revision-free
1	98.6
2	97.28
3	96.46
4	96.07
5	95.47

There are insufficient numbers to give an accurate revision free % beyond 5 years.



PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX-MONTH POST SURGERY

At six-month 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.(see appendix1)
This groups each score into four categories;

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

For the ten year period and as at August 2010, there were 2,066 shoulder questionnaire responses registered at six months post surgery.

The mean shoulder score was 35.96(standard deviation 9.75, range 3 – 48)

Scoring > 41	749
Scoring 34 - 41	623
Scoring 27 - 33	330
Scoring <27	364

At six-months post surgery, 66% had an excellent or good score.

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

This dataset represents sequential Oxford shoulder scores for 333 individual patients.

At six months post surgery, 70% of these patients achieved an excellent or good score and had a mean of 36.55.

At five years post surgery, 70% of these patients achieved an excellent or good score and had a mean of 37.66.

Analysis of the individual questions
Analysis of the individual questions showed that in addition to significant percentages with residual pain there were difficulties with brushing hair (Q7) and hanging clothes in a wardrobe Q9). There has been little change in the percentages for the worst two categories over the 5 year period affirming that the 6 month score is a good indication of the medium term outcome.

Percentage scoring 0 or 1 for each question out of the group of 2,066 at six-months and 333 at five-years.

		6/12	5 yrs
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	14
3	Extreme difficulty or impossible to get in and out of a car or public transport	3	2
4	Extreme difficulty or impossible to use a knife and fork at the same time	5	2
5	Extreme difficulty or impossible to do the household shopping on your own	7	8
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	8	8
7	Extreme difficulty or impossible to brush or comb hair with the operated arm	18	16
8	Extreme difficulty or impossible to dress yourself because of your operated shoulder	7	4
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	16	16
10	Extreme difficulty or impossible to wash and dry under both arms	10	8
11	Pain from operated shoulder greatly or totally interfering with usual work	13	14
12	Pain from shoulder in bed most or every nights	15	11

Revision shoulder questionnaire responses
There were 121 revision shoulder responses with 42% achieving an excellent or good score. This group includes all revision shoulder responses. The mean revision shoulder score was 30.26(standard deviation 10.44, range 3 – 48).

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The **ten**-year report analyses data for the period January 2000 – December 2009. There were 301 primary elbow procedures registered, an additional 34 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

In 2009 there was a 15% drop in elbow arthroplasty registrations, the first drop since 2003.

DATA ANALYSIS

Age and sex distribution

The average age for an elbow replacement was 65.42 years, with range of 23.21 – 91.17 years.

	Female	Male
Number	240	61
Percentage	79.73	20.27
Mean age	65.90	63.52
Maximum age	91.17	87.87
Minimum age	36.38	23.21
Standard dev.	11.73	13.16

Previous operation

None	258
Internal fixation for juxtarticular fracture	12
Synovectomy+-removal radial head	9
Debridement	7
Ulnar Nerve transposition	5
Osteotomy	2
Ligament reconstruction	1
Interposition arthroplasty	1
Other	3

Diagnosis

Rheumatoid arthritis	172
Post fracture	79
Osteoarthritis	35
Other inflammatory	8
Tumour	5
Post dislocation	5
Post ligament disruption	3
Other	4

Approach

Posterior	194
Medial	59
Lateral	22

Bone graft

Humeral autograft	25
Humeral allograft	2
Humeral synthetic	1
Ulnar autograft	2

Cement

Humerus cemented	279	
Antibiotic in cement	187	(67%)
Ulna cemented	267	
Antibiotic in cement	173	(65%)
Radius cemented	18	
Antibiotic in cement	17	(94%)

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	280	(93%)

Operating theatre

Conventional	223
Laminar flow	77
Space suits	33

ASA Class

This was introduced with the updated forms at the beginning of 2005.
For the five-year period 2005 – 2009, there were 150 (88%) 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	6
2	68
3	72
4	4

Operative time (skin to skin)

Mean	134 minutes
Maximum	255 minutes
Minimum	29 minutes
Standard dev	34 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The following figures are for the five- year period 2005 – 2009.

Consultant	168
Advanced trainee supervised	3
Advanced trainee unsupervised	2

Surgeon and hospital workload

In 2009, 21 surgeons performed 34 primary elbow procedures.

Hospitals

In 2009, primary elbow replacement was performed in 21 hospitals. 12 were public and 9 were private.

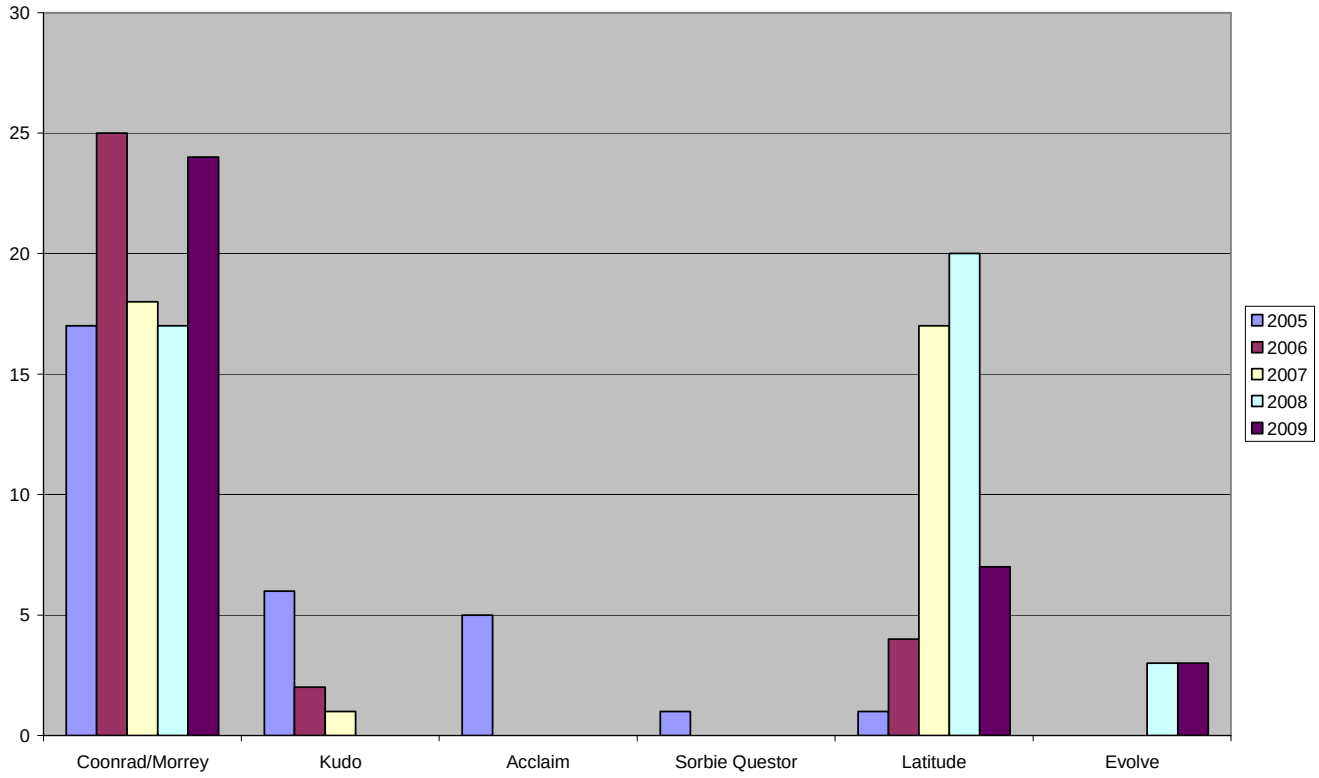
Prosthesis usage

Elbow prostheses used in 2009

Coonrad/Morrey	24
Latitude	7
Evolve	3

In 2009 the Coonrad/Morrey returned to the top of the table and the number of Latitude registrations more than halved.

MOST USED ELBOW PROSTHESES 2005 - 2009



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 ten-year period January 2000 – December 2009, there were 49 revision elbow procedures registered. This is an additional 8 compared to last year's report.
The average age for a revision elbow replacement was 65.08 years, with a range of 42.23 – 88.95 years.

	Female	Male
Number	36	13
Percentage	73.47	26.53
Mean	64.98	65.33
Maximum age	88.95	84.17
Minimum age	42.23	50.73
Standard dev.	9.77	10.28

REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTIES

This section analyses data for revisions of primary elbow procedures for the ten-year period January 2000 – December 2009.

There were 13 revisions of the primary group of 301 (4.32%).
There were 3 that had been revised twice and 1 that had been revised 3 times.

Time to revision

Mean	683 days
Maximum	1180 days
Minimum	62 days
Standard deviation	330 days

Reason for revision

Loosening ulnar component	4
Loosening humeral component	3
Deep infection	3
Pain	2
Fracture humerus	1
Dislocations	1
Dissociation of components	1
Stiffness	1
Instability	1

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.This method utilises the total number of protheses years in the Registry for calculating the revision rates. These rates are usually very low, hence they 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 Total Elbow Arthroplasties

	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
All patients	301	1176.50	13	1.11	0.59	1.89

Revision Rate of individual prostheses

Prosthesis	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Acclaim	16	74.32	3	4.04	0.83	11.80
Coonrad/Morrey	210	907.04	7	0.77	0.31	1.60
Custom device	1	9.18	0	0	0	40.18
Evolve Stem	6	5.55	0	0	0	66.47
Kudo	18	89.61	2	2.23	0.27	8.06
Latitude	49	86.64	1	1.15	0	6.43
Sorbie Questor	1	4.16	0	0	0	88.70

Although there are quite varying revision rates in the above tables none reach statistical significance due to the relatively small numbers and wide CIs The Coonrad Morrey still, however, remains the gold standard for elbow arthroplasty in New Zealand.

Revision vs Gender

Gender	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Females	240	971.81	8	0.82	0.36	1.62
Males	61	204.69	5	2.44	0.79	5.70

Despite higher revision rate for males, not statistically significant.

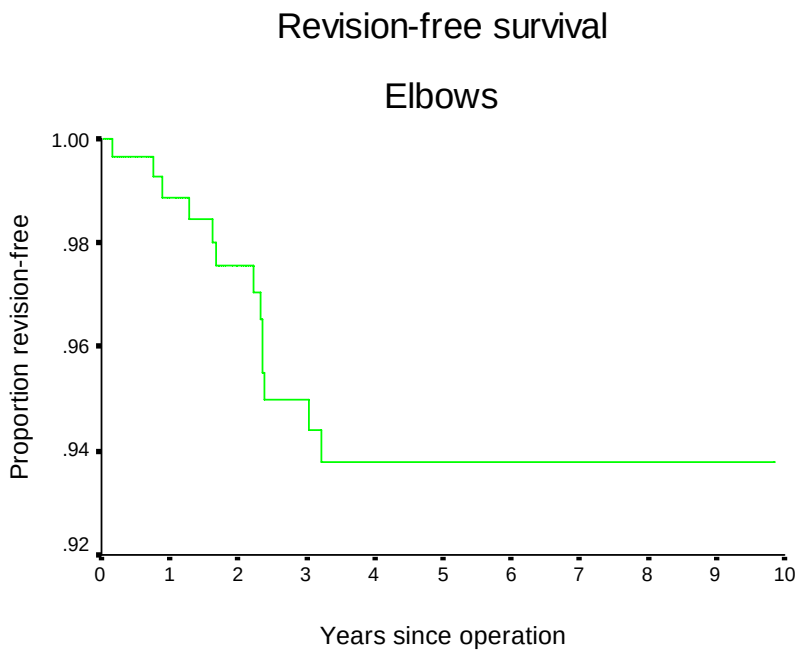
Revision vs Age Bands

Age Bands	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
LT55	59	244.61	2	0.82	0.10	2.95
55_64	84	346.90	7	2.018	0.81	4.16
65_74	86	298.85	2	0.67	0.08	2.42
GE75	72	286.14	2	0.70	0.08	2.52

No significant difference among the age bands.

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses for the years 2000 to 2009 with deceased patients censored at time of death.



Years	% Revision-free
1	98.88
2	97.56
3	94.99
4	93.77

There are insufficient numbers to give an accurate revision free % beyond 4 years.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS POST SURGERY

At six months post surgery patients are sent a questionnaire which is modelled on the Oxford 12, but is not validated. The same scoring system has been adopted as recommended by the original authors of the Oxford 12 hip and knee questionnaires.

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

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

This groups each score into four categories;

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

For the ten year period and as at August 2010, there were 219 primary elbow responses registered at six months post surgery.
The mean primary elbow score was 36.70 (standard deviation 10.06, range 7 – 48)

Scoring > 41	97
Scoring 34 - 41	51
Scoring 27 - 33	31
Scoring < 27	40

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

There were insufficient 5 year questionnaire responses for analyses.

Analysis of the individual questions
Analysis of the individual questions showed that the main concerns at 6 months were carrying the household shopping (Q5), brushing hair(Q7) carrying trays(Q6).

Percentage scoring 0 or 1 for each question (n = 219)

		6/12 %
1	The worst pain from the shoulder is severe or unbearable	12
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	5
4	Extreme difficulty or impossible to get your hand to your mouth	5
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	14
7	Extreme difficulty or impossible to brush or comb hair with the affected arm	15
8	Usually have moderate or severe pain from the operated elbow	14
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	10
10	Extreme difficulty or impossible to wash and dry under both arms	11
11	Pain from operated elbow greatly or totally interfering with usual work or hobbies	14
12	Pain from elbow in bed most or every nights	8

Revision elbow questionnaire responses
There were 23 revision elbow responses with 52% achieving an excellent or good score. This group includes all revision elbow responses. The mean revision elbow score was 34.91 (standard deviation 8.11, range 22 – 48).

LUMBAR DISC REPLACEMENT

PRIMARY LUMBAR DISC REPLACEMENT

This report analyses data for the eight-year period January 2002 – December 2009. There were 111 primary lumbar disc replacements registered to 9 surgeons.

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

DATA ANALYSIS

The average age for a lumbar disc replacement was 39.95 years, with a range of 25.22 – 62.19 years.

	Female	Male
Number	56	55
Percentage	50.45	49.55
Mean age	40.18	39.71
Maximum age	62.19	60.71
Minimum age	25.22	27.19
Standard dev.	8.37	7.34

Disc replacement levels

L3/4	16
L4/5	79
L5/S1	25

Fusion levels

L3/4	1
L4/5	9
L5/S1	47

Previous operation

Discectomy	23
L3/4	0
L4/5	9
L5/S1	14
Fusion	8
ALIF	1
L3/4	0
L4/5	2
L5/S1	9

Diagnosis

Degenerative disc disease	
L3/4	7
L4/5	43
L5/S1	70
Other	1
Annular tear MRI scan	
L3/4	10
L4/5	57
L5/S1	20
Other	1
Discogenic pain on discography	
L3/4	17
L4/5	76
L5/S1	56
Other	1

Approach

Retroperitoneal midline	102
Retroperitoneal lateral	2
Transperitoneal	1
Other- mini open horizontal	1

Intraoperative complications

Damage to major veins	5
Subsidence	1

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	89

Operating theatre

Conventional	69
Laminar flow	42
Spacesuits	2

Operative time (skin to skin)

Mean	143 minutes
Standard deviation	41 minutes
Minimum	74 minutes
Maximum	276 minutes

Surgeon grade

Consultant	111

REVISION OF REGISTERED PRIMARY LUMBAR DISC REPLACEMENTS

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

There were 2 revisions of the primary group of 111 lumbar disc replacements (1.8%) 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, the highest score is used.
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 as follows:
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 scores

Modified Roland and Morris	n = 97
Mean	14.84
Maximum	66
Minimum	1
Standard deviation	6.71

Oswestry Disability Index	n = 30
Mean	47.17
Maximum	82
Minimum	0
Standard deviation	25.85

Post operative score

Oswestry Disability Index	15
Mean	20.56
Maximum	56
Minimum	0
Standard deviation	16.61

CERVICAL DISC REPLACEMENT

PRIMARY CERVICAL DISC REPLACEMENT

This report analyses data for the six-year period January 2004 – December 2009. There were 95 primary cervical disc replacements registered to 12 surgeons.

2004	1
2005	13
2006	14
2007	13
2008	25
2009	29

DATA ANALYSIS

The average age for a cervical disc replacement was 44.73 years, with a range of 24.92 – 65.76 years.

	Female	Male
Number	39	56
Percentage	41.05	58.95
Mean age	46.35	43.60
Maximum age	65.76	58.89
Minimum age	30.14	24.92
Standard dev.	7.51	7.08

Disc replacement levels

C3/4	5
C4/5	6
C5/6	52
C6/7	45
C7T1	0

Previous operation

Foraminotomy	3
Adjacent level fusion	11
Adjacent level disc arthroplasty	0
Discectomy	3

Diagnosis

Acute disc prolapse	69
Chronic spondylosis	2
Neck pain	2
Degenerative disc disease	14
Myelopathy	2

Approach

Anterior right	62
Anterior left	1
Smith Robinson	1

Intra operative complications
There were no intra operative complications reported.

Systemic antibiotic prophylaxis

Patient number receiving systemic antibiotic prophylaxis	52

Operating theatre

Laminar flow	59
Conventional	35
Spacesuits	1

Operative time (skin to skin)

Mean	146 minutes
Standard deviation	61 minutes
Minimum	66 minutes
Maximum	302 minutes

Surgeon grade

Consultant	95

REVISION CERVICAL DISC REPLACEMENT

There was 1 revision cervical disc replacement registered.

There were no revisions of the 95 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, the highest score is used.
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 as follows:
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	57
Mean	33.42
Maximum	92
Minimum	0
Standard deviation	27.18

Post operative score

Neck Disability Index	42
Mean	24.96
Maximum	72
Minimum	0
Standard deviation	20.37

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

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

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

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

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

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

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

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

Accepted for publication by J Bone and Joint Surgery British

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

Submitted to J Bone and Joint Surgey Am

Osteotomy and unicompartmental knee replacement converted to total knee replacement – data from the New Zealand National Joint Registry
Andrew J Pearse, Gary J Hooper, Alastair G Rothwell, Chris Frampton

Does the ASA physical rating score predict early complications or poorer outcomes following hip or knee arthroplasty Analyses from the NZJR J Bone & Joint Surgery Am Hooper G J, Rothwell A G, Hooper N, 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	Exeter
	ABG	Contemporary
	Securfit	Tritanium
	TM Stem	
	ML Taper Stem	
	Avenir Muller stem	
	Continuum	
	TM Modular	
	TM Revision	
ZIMMER		
	CLS	CLS
	CPT	Fitek
	MS30	Fitmore
	Versys	Morscher
	Muller	ZCA
	Duron	Osteolock
		Trilogy

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

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

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	Promos	

ANKLES		
DEPUY	Agility	
	Mobility	
Orthotec	Ramses	
REM Systems	Salto	
Link	Star	

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

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

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

Date: .....

BMI:.....

Side:..... **

Patient Name:
Address:

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

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: .....**
  .....

DIAGNOSIS

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

.....

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

FEMUR

Please do not fold bar-coded label

ACETABULUM

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

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

BONE GRAFT - ACETABULUM

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

FEMORAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

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

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

OPERATING THEATRE

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

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

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Hip Joint

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

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

Tick Appropriate Boxes

REASON FOR REVISION

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

Date Index Operation: .....

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

REVISION

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

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

FEMUR

Please do not fold bar-coded label

ACETABULUM

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR
❑Allograft ❑ Synthetic
❑Autograft

BONE GRAFT - ACETABULUM
❑Allograft ❑ Synthetic
❑Autograft

FEMORAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

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

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

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

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

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

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

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

Tick Appropriate Boxes

Patient Name:
Address:

d.o.b. NHI:
Attach Patient Label

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

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

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

FEMUR

Please do not fold bar-coded label

TIBIA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

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

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

PATELLA

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Revision Knee Joint

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:
Attach Patient Label

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

Hospital: .....

Town/City:.....

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

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

FEMUR

Please do not fold bar-coded label

TIBIA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT – FEMUR

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT – TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

PATELLA

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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:…… **

Tick Appropriate Boxes

Patient Name:
Address:

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

Attach Patient Label

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

PREVIOUS OPERATION ON INDEX JOINT

❑ **None**
❑ **Internal fixation for juxtarticular fracture**
❑ **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 bar-coded label

GLENOID

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

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

BONE GRAFT - GLENOID

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

HUMERAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK ALL LABELS ON REVERSE SIDE

CEMENT

❑ **Humerus** ❑ **Glenoid** ❑ **Antibiotic brand:** ……

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Shoulder

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

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

Attach Patient Label

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

Town/City:.....

REASON FOR REVISION

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

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

REVISION

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

APPROACH

- ❑ Deltopectoral
- ❑ Other: specify

HUMERUS

Please do not fold bar-coded labels

GLENOID

Please do not fold bar-coded labels

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑Allograft
- ❑Autograft
- ❑ Synthetic

BONE GRAFT - GLENOID

- ❑Allograft
- ❑Autograft
- ❑ Synthetic

HUMERAL HEAD

Please do not fold bar-coded labels

AUGMENTS

Please do not fold bar-coded labels

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Ankle

Free Phone 0800-274-989
31.05.2010

Date: .....

BMI:.....

Side:..... **

Patient Name:
Address:

d.o.b. NHI:

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 bar-coded label

TALUS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - TALUS

❑ Allograft
❑ Autograft ❑ Synthetic

AUGMENTS

Please do not fold bar-coded label

FUSION DISTAL TFJ

STICK ALL LABELS ON REVERSE SIDE

CEMENT

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Ankle Joint

Free Phone 0800-274-989
07.04.2005

Date: .....

Side:..... **

Tick Appropriate Boxes

Patient Name:
Address:

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

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

Town/City: .....

REASON FOR REVISION

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

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

REVISION

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

APPROACH

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

TIBIA

Please do not fold bar-coded label

TALUS

Please do not fold bar-coded label

STICK ALL LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

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

BONE GRAFT - TALUS

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

AUGUMENTS

Please do not fold bar-coded label

FUSION DISTAL TFJ

Yes ❑ No ❑

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Replacement Elbow

Free Phone 0800-274-989
07.04.2005

Date: .....

Patient Name:
Address:

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

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 fracture
- ❑ Post ligament disruption
- ❑ Other: Name:

.....

- ❑ Post dislocation

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold bar-coded label

ULNA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT - ULNA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

RADIAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Humerus ❑ Ulna ❑ Radius ❑ Antibiotic brand: .....

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Revision Elbow Joint

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

Date: .....

Side:..... **

Patient Name:
Address:

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

Attach Patient Label

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

Town/City: .....

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ **Medial** ❑ **Lateral** ❑ **Posterior**

HU

Please do not fold bar-coded label

UL

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

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

BONE GRAFT - ULNA

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

RADIAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ **Humerus** ❑ **Ulna** ❑ **Radius** ❑ **Antibiotic brand: .....**

❑ **SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

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

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

PRIMARY OPERATING SURGEON

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

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

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

NEW ZEALAND JOINT REGISTRY
Primary Cervical Disc Replacement

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

Date: .....

Tick Appropriate Boxes

.....

Patient Name:
Address:

DOB: **NHI:**

Attach Patient Label

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

Town/City:.....

ACC ☐ **ACC Claim No:**

LEVELS OF DISC REPLACEMENT

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

DOB: NHI:
Attach Patient Label

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

LEVEL OF REVISION

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

Tick Appropriate Boxes

ACC ☐ **ACC Claim No: .....**

REASON FOR REVISION

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

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

REVISION

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

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

- ❑ Anterior ❑ Posterior ❑ Lateral ❑ Trochanteric

Osteotomy

IMPLANTS

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

STICK EXTRA LABELS ON REVERSE SIDE

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

STICK EXTRA LABELS ON REVERSE SIDE

SYSTEMIC ANTIBIOTIC PROPHYLAXIS
Name .....

OPERATING THEATRE

❑ Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

NEW ZEALAND JOINT REGISTRY
Primary Lumbar Disc Replacement

Free Phone 0800-274-989
14.08.2008

Date: .....

Patient Name:
Address:

d.o.b. NHI:
Attach Patient Label

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

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

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

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

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:** **d.o.b.** **NHI:** ***Attach Patient Label*** **Consultant:** ..... **[If different from patient label]** **Hospital:** ..... **Town/City:** .....

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

REASON FOR REVISION

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

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

REVISION

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

APPROACH

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

NEW DISC REPLACEMENT Levels

- ❑ **L3/4**
- ❑ **L4/5**
- ❑ **L5/S1**

NEW FUSION Levels

- ❑ **L3/4**
- ❑ **L4/5**
- ❑ **L5/S1**

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 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.

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.