NEW ZEALAND ORTHOPAEDIC ASSOCIATION

NATIONAL JOINT REGISTRY

EIGHT YEAR REPORT

JANUARY 1999 TO DECEMBER 2006

This report was prepared by staff of the New Zealand National Joint Registry.

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EDITORIAL COMMENT

It is our pleasure to present the eight year report of the New Zealand Orthopaedic Associations National Joint Registry. The format of previous years has been followed but there is greater statistical analyses of the performance of prostheses especially for the hip and knee. As well as Kaplan Meier curves we have introduced revision rates per 100 component years which statisticians consider is the more accurate way of deriving our revision rates when analysing data with widely ranging follow-up times. This and other statistical terms are explained in the appropriate sections.

The report has been compiled such that each arthroplasty section is self contained.

The total number of registered joint arthroplasties at 31.12.06 was 86061 an increase of 13933 for 2006 and compared to the 13675 increase in 2005 represents a 1.8% gain which is the smallest annual percentage increase for the Registry. The only areas of significant gain were resurfacing hips (105%) shoulders (25%) and ankles (15%). Hips and knees contributed 1.6% and 2.5% respectively. There were percentage decreases of registered revisions.

Analysis of data for revision joints that had had the primary operation prior to 1999 has not been undertaken this year. Instead the focus has been on a more in-depth analysis of the revisions of registered primary joints especially the hips and knees.

In last years report it was noted that cemented femoral components had been performing better than uncemented over the seven year period but there appeared to be little difference between cemented and uncemented acetabular components. As a follow-up this year we have looked at prosthesis survival in a number of different areas eg., within age bands, male versus female, fixation method, revision for dislocation versus approach, surgeon annual work load. In addition we have looked at the revision rates for 38 hip prosthesis matchings for which we have a minimum of 250 primary procedures. In total there are 551 hip prosthesis matchings recorded in the Registry. Overall the revision rate of 0.63 per 100 component years and revision free survival of 95.3% at 8 years for primary hip arthroplasty compare very favourably with other registries but there are significant differences between uncemented and fully cemented prostheses among the various age bands. The comparable overall figures for total knee arthroplasty are 0.56 per 100 component years and 96.4% revision free survival at 8 years.

For the first time we have analysed re-revisions of hips and knees and confirmed that the Kaplan Meier survival curve is significantly steeper than for primary joints.

169 resurfacing hips were registered during 2006 more than double the number registered in 2005. This represents 2.6% of primary hip arthroplasties registered in 2006.

In the last report it was noted that the use of image guidance surgery had declined in 2005 but it had a resurgence with the technique being used in 568 (7.1%) of total knee arthroplasties compared to 0.3% the previous year. However there was minimal use of the technique in hip and unicompartmental knee arthroplasty. The reverse was true for minimally invasive surgery where like the previous year 30% of unicompartmental arthroplasties were performed via this approach compared to just 0.1% for total knee arthroplasty. There was a 246% increase in the use of this technique for primary hip arthroplasty and it accounted for 6% of hip approaches in 2006.

2006 was the 2nd year ASA gradings were recorded and it is pleasing to note that the response rate has greatly improved to more than 70% compared to the 50% for 2005. The relative ASA percentages however remain unchanged with the majority being ASA class 2 ie., a person with mild systemic disease except for elbow arthroplasty where the majority of patients have rheumatoid arthritis.

2006 was also the 2nd year for which it was possible to differentiate between supervised and unsupervised trainee surgeons. It is interesting that the numbers for 2006 doubled in both categories for both primary hip and knee procedures compared to 2005 which probably reflects more accurate data collection at the time of surgery, rather than a sudden increase in trainee surgery.

In the shoulder section we have compared the survival of total arthroplasty with hemi arthroplasty and there is no significant difference between the revision rate per 100 component years but on the Kaplan Meier curve hemi arthroplasties appear to be failing faster between the 3 and 5 year period but this may be partly due to the relatively small numbers implanted for this time length.

In the ankle section it can be seen that the Agility and Star prostheses have been completely superseded by the mobile bearing prostheses.

Oxford 12 Questionnaire
We now have greater numbers of 6 month and 5 year questionnaire results for hips and knees and as was noted last year the average 5 year score does not significantly improve upon the average six month score.

Last year we first reported the relationship between the 6 month Oxford 12 scores and early revision. This has been analysed further using 3 different statistical methods and all confirm that there is indeed a significant relationship between the Oxford 12 score at 6 months and revision within 2 years. For example a person with a primary knee arthroplasty who has an Oxford score at 6 months greater than 40 has 27 times the risk of a revision within 2 years compared to a person with a score between 16 and 20. Alternatively for every one unit increase in the Oxford score there was a 12% risk of revision within the first 2 years following primary knee arthroplasty or 11% following primary hip arthroplasty. The relationship loses significance after 2 years but even so the 6 month Oxford 12 score should be a useful guide as to which patients need closer monitoring following arthroplasty surgery.

Prostheses inventory. In view of the ever increasing numbers of different joint prostheses a list of the current companies supplying these prostheses is included in the appendix.

Alastair Rothwell	Toni Hobbs	Chris Frampton
Supervisor	Coordinator	Statistician

ACKNOWLEDGMENTS

The Registry is very appreciative of the support from the following

Canterbury District Health Board:
for the website and other facilities

Kim Miles, New Zealand Orthopaedic Association:
for his persistent and very successful efforts in obtaining long term funding for the Registry

OILA Group:
for their strong support and commitment to the Registry

NZHIS:
for audit compliance information

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

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

Burwood Hospital, Christchurch 8083, Contact: Diane Darley

Christchurch Hospital, Christchurch 8140, Contact: Carolyn Wood

Dunedin Hospital, Dunedin 9016, Contact: Nancy Sweeney

Gisborne Hospital, Gisborne 4010, Contact: Jackie Dearman

Grey Base Hospital, Greymouth 7840, Contact: Jennifer Woods

Hawkes Bay Hospital, Hastings 4120, Contact: Jane Hurford-Bell

Hutt Hospital, Lower Hutt 5040, Contact: Michelle Kinzett

Kenepuru Hospital, Porirua 5240, Contact: Judy Tully

Manukau Surgery Centre, Auckland 2104, Contact Amanda Ellis

Masterton Hospital, Masterton 5840, Contact: Michelle Gillespie

Middlemore Hospital, Auckland, 1640 Contact: Luisa Lilo

Nelson Hospital, Nelson 7040, Contact: Pauline Manley

Northshore Hospital, Waitemata DHB, Takapuna 0740, Contact: Chris Cavalier

Palmerston North Hospital, Palmerston North 4442, Contact: Philip Prujean or Karen Langvad-Forster

Rotorua Hospital (Lakeland), Rotorua 3046, Contact: Maggie Walsh

Southland Hospital, Invercargill 9812, Contact: Helen Powley

Taranaki Base Hospital, New Plymouth 4342, Contact: Allison Tijsen

Tauranga Hospital, Tauranga 3143, Contact: Susan Clynes

Timaru Hospital, Timaru 7940, Contact: Angela Matten

Waikato Hospital, Hamilton 3204, Contact: Maria Ashhurst or Helen Keen

Wairau Hospital, Blenheim 7240, Contact: Monette Johnston

Wanganui Hospital, Wanganui, Contact: Heather Richardson

Wellington Hospital, Newtown 6242, Contact: Rebecca Kay

Whakatane Hospital, Whakatane 3158, Contact: Karen Burke

Whangarei Area Hospital, Whangarei 0140, Contact: Beth McLean

PRIVATE HOSPITALS

Aorangi Hospital, Palmerston North 4410, Contact: Frances Clark

Ascot Integrated Hospital, Remuera (Private Bag)1050, Contact Michelle Gilfoyle

Belverdale Hospital, Wanganui 4500, Contact: Anlie Steynberg

Bidwill Trust Hospital, Timaru 7910, Contact Carmel Hurley-Watts

Boulcott Hospital, Lower Hutt 5040, Contact: Karen Hall

Bowen Hospital, Wellington, 6035 Contact: Pam Kohnke

Braemar Hospital Ltd, Hamilton 3204, Contact: Allison Vince

Chelsea Hospital, Gisborne 4010, Contact Jenny Long

Kensington Hospital, Whangarei 0112, Contact: Sandy Brace

Manuka Street Trust Hospital, Nelson 7010, Contact: Diane Molyneux

Mercy Integrated Hospital, Auckland 1023, Contact: Margie Robertson

Mercy Hospital, Dunedin 9054, Contact: Liz Cadman

Norfolk Southern Cross Hospital, 186 Cambridge Road, Tauranga 3110, Contact: Ann Heke

Norfolk Southern Cross Hospital, 62 Grace Road, Tauranga 3112, Contact: Anne Clemance

Queen Elizabeth Hospital, Rotorua 3010, Contact: Chris Mott

Royston Hospital, Hastings 4112, Contact: Suzette Du Plessis

St Georges Hospital, Christchurch, 8014, Contact: Steph May

Southern Cross Hospital, Brightside, Epsom 1023, Contact: Theresa Lambert

Southern Cross Hospital, Christchurch Central 8013 Contact: Diane Kennedy

Southern Cross Hospital, Hamilton East 3216, Contact: Sharon Buttimore

Southern Cross Hospital, Invercargill Central, 9810, Contact: Jill Hansen

Southern Cross Hospital, New Plymouth 4310, Contact: Raewyn Woolliams

Southern Cross North Harbour, Wairau Valley 0627, Contact: Rita Redman

Southern Cross Hospital, Palmerston North 4410, Contact: Susan Wright

Southern Cross Hospital, Rotorua 3015, Contact: Eleanor Spencer

Southern Cross Hospital, Newtown, Wellington, 6021, Contact: Shannon Hindle

Wakefield Hospital, Newtown, Wellington 6021, Contact: Jan Kereopa

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ACCIDENT COMPENSATION CORPORATION

DISTRICT HEALTH BOARDS

MINISTRY OF HEALTH

NEW ZEALAND ORTHOPAEDIC ASSOCIATION

ORTHOPAEDIC SURGEONS

SOUTHERN CROSS HOSPITALS

WISHBONE TRUST

PROFILE OF THE AVERAGE NEW ZEALAND ORTHOPAEDIC SURGEON 2006 *

From our analyses the average orthopaedic surgeon performs on an annual basis:

- 36 Total hip arthroplasties — using uncemented, fully cemented and hybrid prostheses in approximatley equal proportions: has a 95.3% survival at 8 years and a revision rate of 0.63 per 100 component years; 0.32% have been revised for deep infection; 77% at 6 months and 84% at five years had an excellent or very good Oxford Score.
- 30 Total knee arthroplasties — with almost all cemented but only 10 with patellae replaced; has a 96.4% survival at 8 years and a revision rate of 0.56 per 100 component years; 0.46% have been revised for deep infection; 61% at 6 months and 71% at 5 years had an excellent or very good Oxford Score.
- 7 Unicompartmental knee arthroplasties — almost all cemented; has a 92.67% survival at 5 years and a revision rate of 1.54 per 100 component years; 0.2% have been revised for deep infection; 68% at six months and 79% at 5 years had an excellent or very good Oxford Score.
- 5 Shoulder arthroplasties — with a 50/50 split between total and hemi; has a 95.4% survival at 5 years and a revision rate of 0.99 per 100 component years; 0.1% have been revised for deep infection; 54% had an excellent or very good Oxford Score at 6 months.
- 9 total ankle arthroplasties — all uncemented; has a revision rate of 1.3 100 component years; none revised for deep infection; 42% had excellent or very good Oxford derived scores at 6 months.
- 2 total elbow arthroplasties — most likely a cemented Coonrad-Morrey prosthesis; a revision rate of 1.4 100 component years; 1.2% have been revised for deep infection; 66% had excellent or very good Oxford derived scores at 6 months.

*** averages derived from the number of surgeons actually doing the above procedures 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 the first Registry to collect data from Patient Generated Outcomes. The “Oxford 12” validated Hip and Knee patient 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 THA’s and TKA’s and on the advice of our statistician, questionnaires have been sent out on a random selection basis since July 2002 to achieve 1000 annual responses 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, the Wishbone Trust and for the last three years significant annual grants from the ACC. From 2002 funding has become more reliable with the surgeons paying the $10 levy for each joint registered from a

private hospital, and the MOH agreeing to pay $72,000 a year as part of the Government Joint Initiative. For 2005 the Southern Cross Hospitals have contributed $10,000.

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.

Reporting to the NZOA
A Registry update is provided in the quarterly newsletter as well as an annual report and financial statement.

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 trialing 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 six monthly surgeon and hospital reports.

The Oxford questionnaire was available for the shoulder joint and was adapted for the elbow and ankle joints.

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 2006 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 include up 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 three 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 2006 Registry staff are Alastair Rothwell, Supervisor, Toni Hobbs, Coordinator, Pat Manning Secretary, Lynley Diggs and Anne McHugh data processors.

Use of Registry Data

There have been increasing numbers of requests for information from the Joint 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 credited personnel and it is emphasised that Ethics Committee approval is required for any research projects involving patient contact.

Registry Committee

This committee has now been formalised and the membership consists of: 3 Orthopaedic Surgeons; Registry Coordinator; OILA Representative; Arthritis New Zealand Representative; Chief Executive NZOA. The main tasks of the Committee 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 2006

Numbers of procedures registered

	8 years	7 Years	6 Years	5 Years
Hips, primary	42421	35998	29680	23457
Hips, revision	6383	5487	4570	3641
Knees, primary	28705	23565	18537	14371
Knees, revision	2499	2149	1736	1419
Knees, unicompartmental	3709	3122	2565	1926
Shoulders, primary	1641	1275	982	693
Shoulders, revision	105	80	57	45
Elbows, primary	191	160	130	101
Elbows, revision	31	26	20	15
Ankles, primary	298	216	146	99
Ankles, revision	19	12	8	6
Lumbar Disc, primary	59	38	22	
TOTAL	**86061**	**72128**	**58,453**	**45,776**

BILATERAL JOINT REPLACEMENTS CARRIED OUT UNDER THE SAME ANAESTHETIC

Bilateral hips	887 patients	(1774 hips)	4.0%	of primary hips
Bilateral knees	1316 patients	(2632 knees)	9.0 %	of primary knees
Bilateral Unicompartmental knees	297 patients	(594 knees)	16.0%	of primary uni knees
Bilateral ankles	2 patients	(4 ankles)		
Bilateral shoulders	2 patients	(4 shoulders)		

The percentages have remained essentially unchanged from the previous reports.

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

HIP ARTHROPLASTY

PRIMARY HIP ARTHROPLASTY

The eight year report analyses data for the period January 1999 – December 2006. There were 42,421 primary hip procedures registered, an additional 6,424 compared to last year's report. This includes 329 resurfacing procedures and the 169 registered during 2006 represents a 105% increase.

1999	4118
2000	4722
2001	4931
2002	4829
2003	5051
2004	6028
2005	6318
2006	6424

As expected registrations have plateaued over the last three years after the big leap in 2004 following the commencement of the Ministry of Health Joint Initiative.

DATA ANALYSIS

Age and Sex Distribution

The average age for all patients with primary hip arthroplasty was 66.84 years with a range of 15.43 – 100.13years.

Further analysis is in the following charts.

All hip arthroplasty

	Female	Male
Number	22262	20159
Percentage	52.48	47.52
Mean age	68.33	65.16
Maximum age	100.13	96.97
Minimum age	15.43	15.87
Standard dev.	11.76	11.48

Conventional hip arthroplasty

	Female	Male
Number	22176	19916
Percentage	52.68	47.32
Mean age	68.44	65.33
Maximum age	100.13	96.97
Minimum age	15.43	15.87
Standard dev.	11.71	11.41

Resurfacing Hip Arthroplasty

	Female	Male
Number	86	243
Percentage	26.14	73.86
Mean age	48.59	51.60
Maximum age	65.88	69.77
Minimum age	25.72	20.55
Standard dev.	8.16	8.79

Previous operation

None	39989
Internal fixation	951
Osteotomy	292
Internal fixation for SUFE	87
Arthrodesis	45
Core decompression	35
Arthroscopy/arthrotomy	28
Open reduction	18
Other	61

Diagnosis

Osteoarthritis	35937
Acute fracture NOF	1501
Avascular necrosis	1385
Developmental dysplasia	1231
Rheumatoid arthritis	752
Old fracture NOF	591
Other inflammatory	449
Post acute dislocation	162
Tumour	183
Fracture acetabulum	80
Other	83

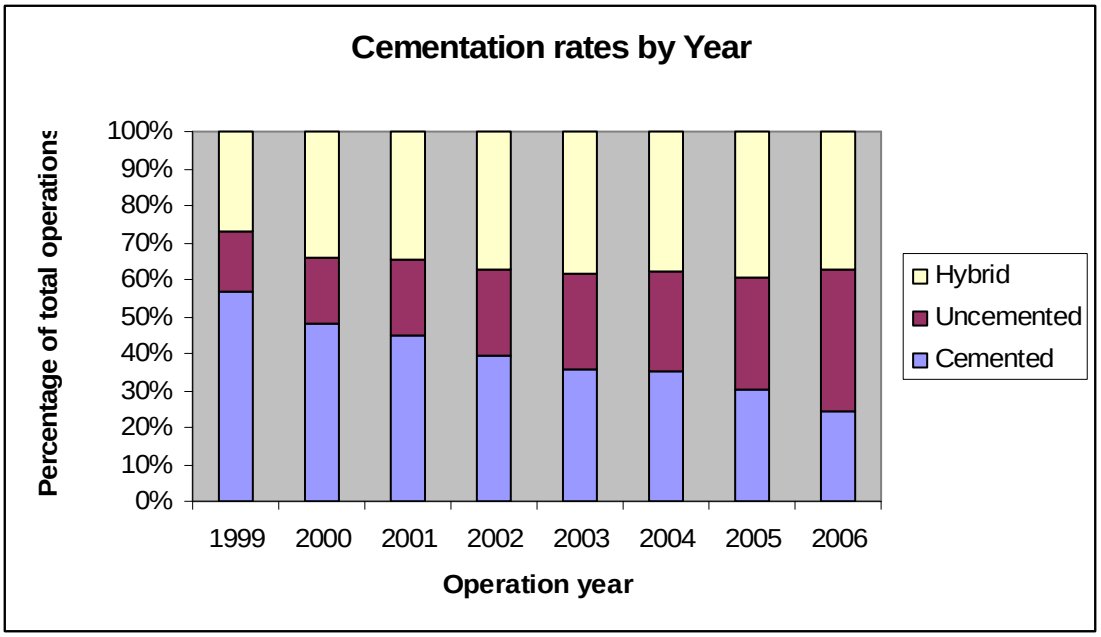
Approach

Posterior	25582
Lateral	12102
Anterior	2388
Minimally invasive	540
Trochanteric osteotomy	97
Image guided surgery	25

Image guided surgery was added to the updated forms at the beginning of 2005

The number of minimally invasive procedures has increased by 384 over the last year, a 246% increase. Image guided surgery has made its first appearance for the hip joint.

Bone graft		**Cement**		
Femoral autograft	108	Femur cemented	31118	(73%)
Femoral allograft	22	Antibiotic in cement	15956	(51%)
Femoral synthetic	2	Acetabulum cemented	16401	(39%)
		Antibiotic in cement	8614	(53%)
Acetabular autograft	278			
Acetabular allograft	39			
Acetabular synthetic	2			



There has been a steady decline in fully cemented hips over the eight year period from 55% to 25%, with cemented femurs dropping from 80% to 65%; whereas uncemented hips have risen from 20% to 35%.

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 40442 (95%)

A cephalosporin was used in 95% of patients.

Operating theatre

Conventional	29003
Laminar flow	12307
Space Suits	7466

The percentage of surgery carried out in Laminar Flow Theatres has remained static over the last year at 30%. There has been a slight increase in the use of space suits from 16 to 18% (see also infection versus theatre type in the revision section).

ASA Class

This was introduced with the updated forms at the beginning of 2005.
There are 9168 (72%) registered primary hip 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 systemic disease that is a constant threat to life

Analysis of ASA class and age

ASA	Number	Percentage	Mean age
1	1625	18	58.40
2	5424	59	67.17
3	2033	22	77.23
4	86	1	72.90

Analysis of ASA class and public versus private hospitals

ASA	% Public	% Private
1	11	25
2	60	58
3	28	16
4	1	1

As noted previously patients with higher ASA gradings ie greater morbidity, are more likely to have their surgery in a public hospital.

Operative time – skin to skin

Mean	82	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.

Consultant	11066
Advanced trainee supervised	853
Basic trainee	350
Advanced trainee unsupervised	248

The number of advanced trainee supervised cases almost doubled in 2006 (562) compared to 2005 (291), and more than doubled for both unsupervised and basic trainee categories. This big rise is probably due to more careful data form checking in the operating theatres and should be of interest to members of the Education Committee.

Prosthesis usage

Conventional primary hips

Top 10 femoral components used in 2006

Exeter V40	1952
CLS	796
Spectron	577
Muller	359
Corail	294
TwinSys uncemented	287
Accolade	262
Synergy porous	206
MS 30	201
CPT	174

The big mover in 2006 was the Twinsys uncemented femur.

Top 10 acetabular components used in 2006

Trident	965
RM cup	704
Contemporary	628
Reflection porous	576
Duraloc	470
Trilogy	286
Fitmore	269
Pinnacle	267

Morscher	261
Reflection cemented	243

The RM cup which first appeared in the top 10 chart in 2005 has really taken off increasing its number by 140% during 2006.

Resurfacing hips

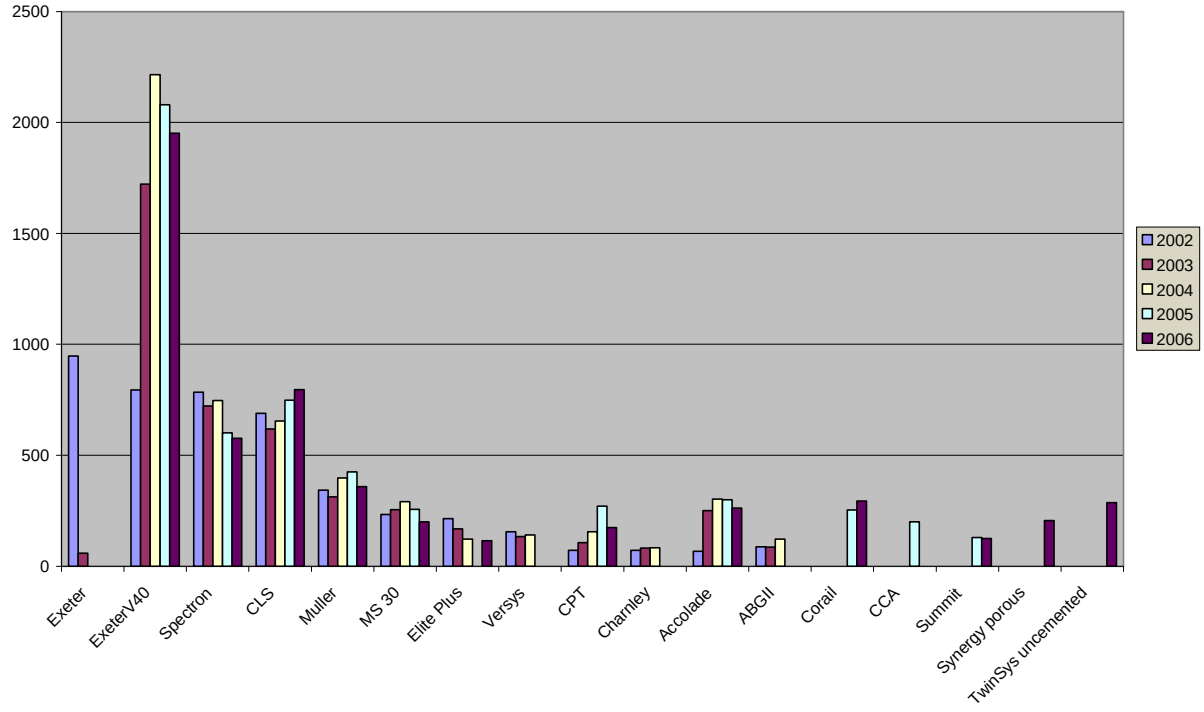
	2004	2005	2006
BHR	7	101	132
ASR	10	38	37
Durom	4		
Total	**21**	**139**	**169**

The BHR is the most common resurfacing prosthesis at 73% of the total.

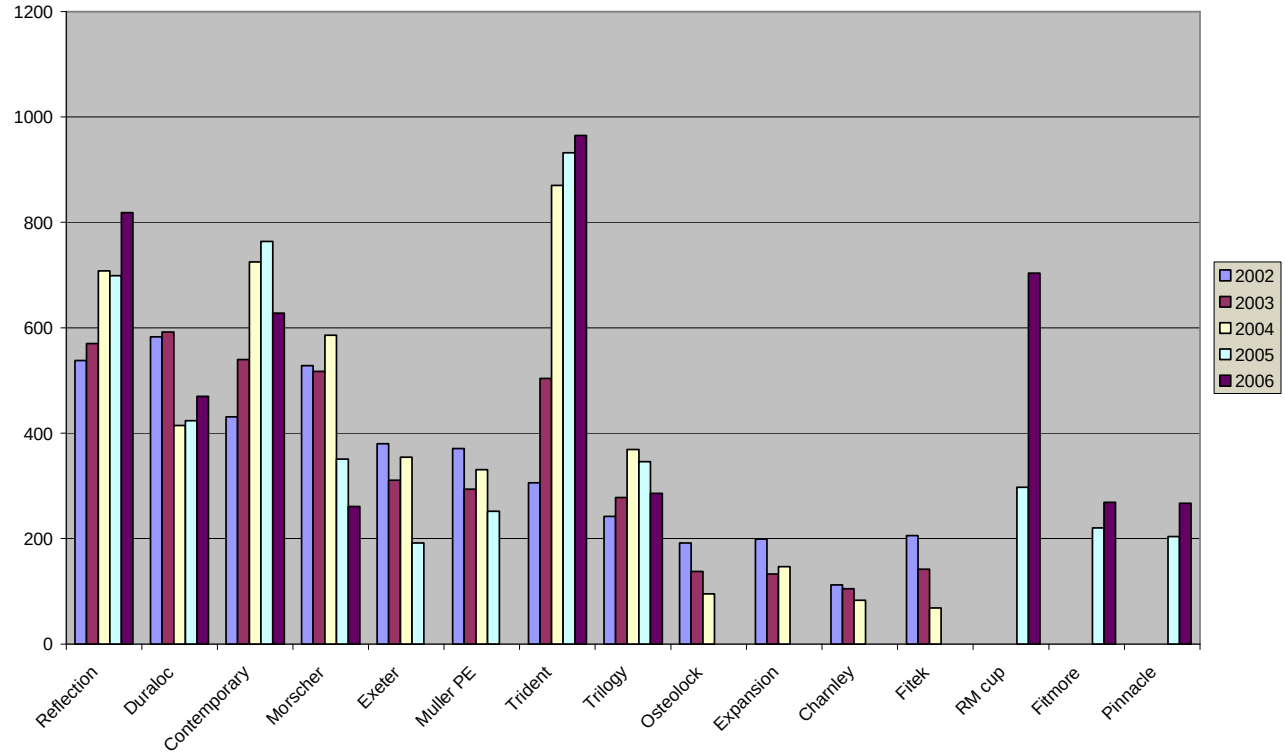
Matching of the Main Femoral and Acetabular Components 1999 – 2006

See the revision section

MOST USED FEMORAL COMPONENTS 5 YEARS 2002 – 2006



MOST USED ACETABULAR COMPONENTS 5 YEARS 2002 – 2006



Surgeon and hospital workload

Surgeons
In 2006 179 surgeons performed 6,424 primary total hip replacements, an average of 36 procedures per surgeon.
29 surgeons performed less than 10 procedures and 45 performed more than 50.

These are similar numbers to last years report

Hospitals
In 2006 primary hip replacement was performed in 50 hospitals, 26 public and 24 private.

The average number of total hip replacements per hospital was 129.

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 eight year period January 1999 – December 2006, there were 6,383 revision hip procedures registered. This is an additional 895 compared to last year's report.

The average age for a revision hip replacement was 69.61 years, with a range of 18.47 – 97.72 years.

Revision hips

	Female	Male
Number	3157	3226
Percentage	49.46	50.54
Mean age	69.64	69.58
Maximum age	97.72	94.87
Minimum age	18.47	25.68
Standard dev.	12.43	10.78

The percentage of revision to primary hips remains at 13% ie for every 100 hip arthroplasties performed 13 will be revision procedures.

Analysis of data for revision hips that had the primary operation prior to 1999 has not been undertaken this year. Instead the focus has been on a more in-depth analysis of the revisions of registered primary joints.

REVISION OF REGISTERED PRIMARY HIP ARTHROPLASTIES
This section analyses data for revisions of primary hip procedures for the eight year period.
There were 909 revisions of the 42,092 primary conventional hip replacements (2.16%) and 3 revisions of the 329 resurfacing hip replacements (0.9%), a total of 912.

Time to revision

Mean	734 days
Maximum	2850 days
Minimum	0 days
Standard deviation	720 days

Reason for revision

Dislocation	369
Loosening acetabular comp.	171
Deep infection	137
Loosening femoral component	128
Pain	85
Fracture femur	67
Wear polyethylene	17
Osteolysis	10
Implant breakage	6
Malposition of components	5
Wear acetabulum	4
Tumour	4
Subsidence of prostheses	4
Exploded ceramic head	1
Other	14

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	41%
Loosening acetabular comp.	19%
Deep infection	15%
Loosening femoral component	14%

Analysis by time of the 4 main reasons for revision

Dislocation n = 369

< 6 months	170
6 months – 1 year	43
>1 – 2 years	68
>2 – 3 years	36
>3 – 4 years	24
>4 – 5 years	14
>5 – 6 years	7
>6 – 7 years	6
>7 – 8 years	1

Loosening acetabular component n = 171

< 6 months	32
6 months – 1 year	14
>1 – 2 years	29
> 2 – 3 years	22
>3 – 4 years	22
> 4 – 5 years	17
> 5 – 6 years	17
> 6 – 7 years	15
>7 – 8 years	3

Deep infection n = 137

< 6 months	24
6 months – 1 year	21
>1 – 2 years	34
> 2 – 3 years	24
>3 – 4 years	16
> 4 – 5 years	12
> 5 – 6 years	2
> 6 – 7 years	3
>7 – 8 years	1

Loosening femoral component n = 128

< 6 months	10
6 months – 1 year	12
>1 – 2 years	22
> 2 – 3 years	17
>3 – 4 years	17
> 4 – 5 years	15
> 5 – 6 years	18
> 6 – 7 years	14
>7 – 8 years	3

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

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

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

Revision by Hip Prosthesis Matchings

Femoral component	Acetabular component	Total	Number revised	Observed component years	Rate/100 component years	Exact 95% confidence interval
Accolade	Trident	1035	21	2110	1.0	0.62, 1.52
CCA	CCB	417	6	1056	0.6	0.21, 1.24
CLS	CLS Expansion	967	29	3972	0.7	0.49, 1.05
	Duraloc	630	17	2612	0.7	0.38, 1.04
	Fitek	623	8	2824	0.3	0.12, 0.56
	Fitmore	450	12	859	1.4	0.72, 2.44
	Morscher	1440	39	5345	0.7	0.52, 1.0
CPT	ZCA	438	13	1854	0.7	0.37, 1.2
Charnley	Charnley	732	12	3242	0.4	0.19, 0.65
Corail	Duraloc	313	1	619	0.2	0.0, 0.90
	Pinnacle	261	4	384	1.0	0.28, 2.67
Elite Plus	Charnley	332	9	1833	0.5	0.19, 0.88
	Duraloc	541	13	1808	0.7	0.39, 1.30

	Elite Plus LPW	266	4	1102	0.4	0.10, 0.94
Exeter	Contemporary	1551	45	8789	0.5	0.37, 0.69
	Duraloc	552	27	3213	0.8	0.55, 1.22
	Exeter	1326	41	7220	0.6	0.41, 0.77
	Morscher	551	16	3199	0.5	0.29, 0.81
	Osteolock	837	29	4587	0.6	0.42, 0.91
Exeter V40	Contemporary	2707	30	5471	0.5	0.37, 0.78
	Duraloc	738	11	1726	0.6	0.32, 1.14
	Exeter	1164	12	2984	0.4	0.21, 0.70
	Morscher	485	9	1133	0.8	0.36, 1.51
	Osteolock	269	7	884	0.8	0.32, 1.63
	Trident	1839	22	3335	0.7	0.41, 1.0
	Trilogy	673	6	1412	0.4	0.16, 0.93
MS 30	Morscher	697	19	2818	0.7	0.41, 1.05
	Muller PE	441	9	1613	0.6	0.26, 1.06
Muller	Muller PE	1694	17	7145	0.2	0.14, 0.38
	RM cup	871	19	2968	0.6	0.39, 1.00
	Weber	326	5	1086	0.5	0.15, 1.07
Spectron	Duraloc	1129	42	4886	0.9	0.62, 1.16
	Reflection cemented	2587	57	10802	0.5	0.40, 0.68
	Reflection porous	1427	21	4327	0.5	0.3, 0.74
Summit	Pinnacle	261	2	373	0.5	0.06, 1.94
Synergy porous	Reflection porous	439	8	682	1.2	0.51, 2.31
Versys	Trilogy	271	5	1226	0.4	0.13, 0.95
Versys cemented	ZCA	312	7	1290	0.5	0.22, 1.12

There are 551 hip prosthesis matchings in the Registry. The table above contains the analysis of the 38 matchings which 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 rate.

Revision by Age Groups

Age	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
<55	6430	23411	193	0.82	0.71, 0.95
55-64	10467	36619	257	0.70	0.62, 0.79
65-74	13973	48606	267	0.55	0.49, 0.62
>74	11222	36332	192	0.53	0.46, 0.61

Revision by Arthroplasty Fixation

Fixation	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
Cemented	16005	61793	302	0.49	0.44, 0.55
Uncemented	10898	32442	273	0.84	0.74, 0.95
Hybrid	15189	50733	334	0.66	0.59, 0.73
Overall	**42092**	**144968**	**909**	**0.63**	**058 – 0.67**

Overall the revision rate/100 component years is very low regardless of the fixation type.

Revision by Age Groups versus Fixation

Age	Fixation	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	P Values		
							CvsU	CvsH	UvsH
<55	Cemented	500	2427	31	1.28	0.87, 1.81	0.01	0.012	0.65
	Uncemented	4024	13412	108	0.81	0.66, 0.97			
	Hybrid	1906	7572	54	0.71	0.54, 0.93			
55-64	Cemented	1790	8022	54	0.67	0.51, 0.88	0.21	0.34	0.007
	Uncemented	4354	12970	113	0.87	0.72, 1.05			
	Hybrid	4323	15627	90	0.58	0.46, 0.71			
65-74	Cemented	6068	24371	106	0.43	0.36, 0.53	0.006	0.01	0.34
	Uncemented	2021	5022	40	0.80	0.57, 1.08			
	Hybrid	5884	19213	121	0.63	0.52, 0.75			
>74	Cemented	7647	26973	111	0.41	0.34, 0.50	0.002	0.001	0.43
	Uncemented	499	1037	12	1.16	0.60, 2.02			
	Hybrid	3076	8321	69	0.83	0.65, 1.05			

P Values demonstrate that; for under 55 age group the revision rate for uncemented and hybrid hips is significantly lower than for fully cemented; for 55-64, hybrid hips have a significantly lower revision rate than either uncemented or cemented and for 65 plus cemented hips have a significantly lower revision rate than either hybrid or uncemented.

Revision for Deep Infection vs Theatre Type

Theatre	Space suit	Total	Observed component years	Number revised for deep infection	Rate/100 component years	Exact 95% confidence interval
Conventional	No	27304	101871	92	0.09	0.07, 0.11
	Yes	1699	3054	5	0.16	0.05, 0.38
Laminar flow	No	6897	20776	23	0.11	0.07, 0.17
	Yes	5500	16254	14	0.09	0.05, 0.14

P values demonstrate that there is no significant difference in revision for infection rates with the different combinations.

Revision by ASA : Public vs Private Hospital

ASA	Hospital	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
1	Public	561	433	5	1.2	0.37, 2.69
1	Private	1064	809	7	0.9	0.35, 1.78
2	Public	2949	2237	29	1.3	0.87, 1.86
2	Private	2475	1861	14	0.8	0.41, 1.26
3	Public	1359	1026	14	1.4	0.75, 2.29
3	Private	674	500	7	1.4	0.56, 2.88
4	Public	65	43	1	2.3	0.58, 12.83
4	Private	21	17	0	0.0	0.00, 21.2

The confidence intervals are generally wide due to the relatively small numbers of component years in each ASA group.

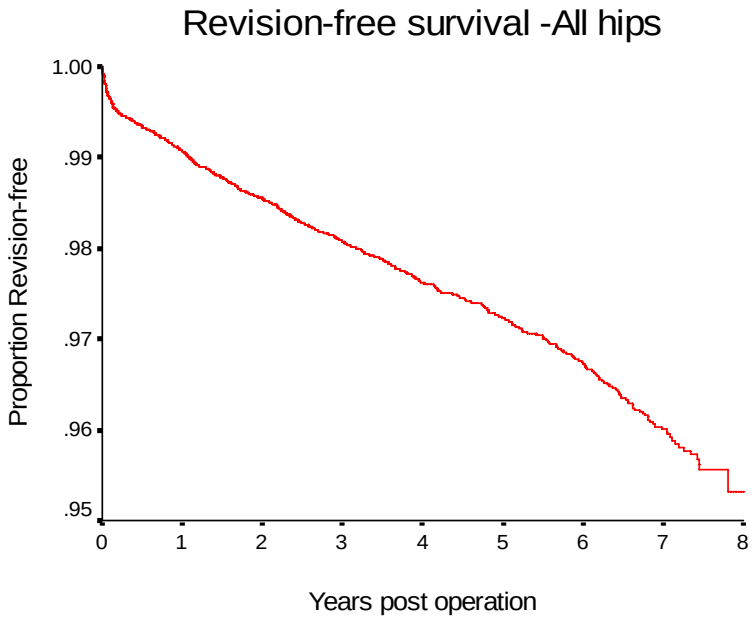
Surgeon Annual Workload vs Revision

Operations per annum	Number of operations	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
< 10	412	1416	12	0.85	0.44, 1.5
10-24	4200	13770	77	0.56	0.44, 0.70
25-49	20104	69997	477	0.68	0.62, 0.75
50-74	7953	27892	164	0.59	0.50, 0.69
75-99	3666	12169	64	0.53	0.41, 0.67
>99	4666	16529	91	0.55	0.44, 0.67

Apart from those surgeons doing less than 10 primary arthroplasties a year the revision rates are all very similar.

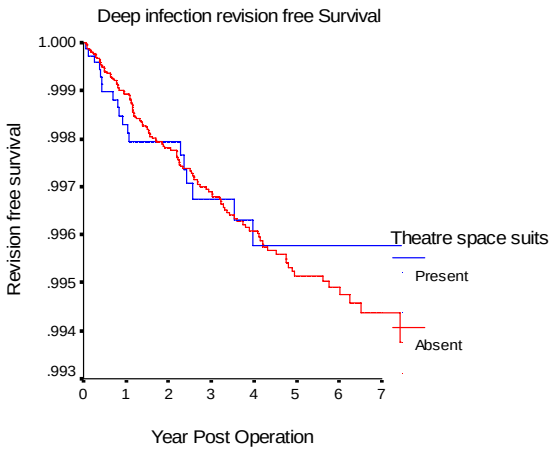
KAPLAN MEIER CURVES

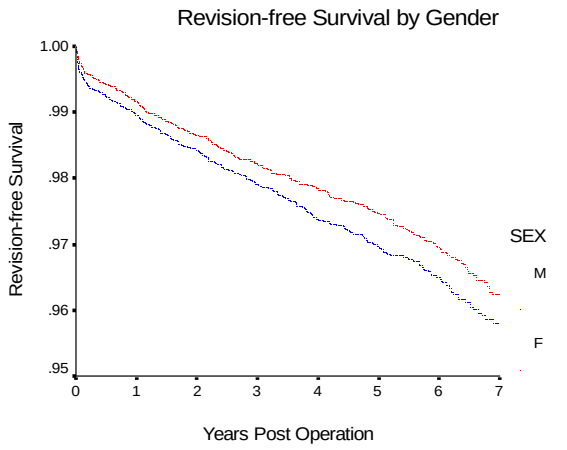
The following Kaplan Meier survival analyses are for years 1999 to 2006 with deceased patients censored at time of death.

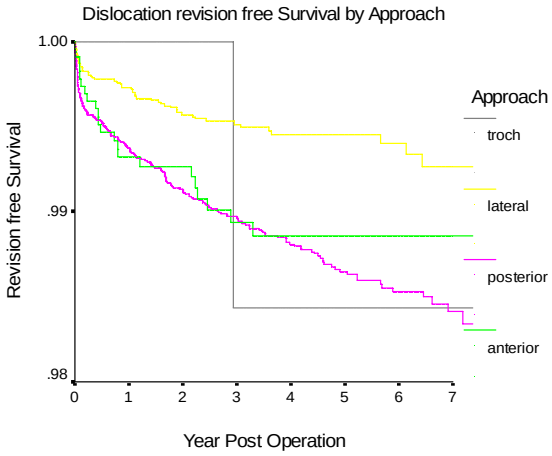


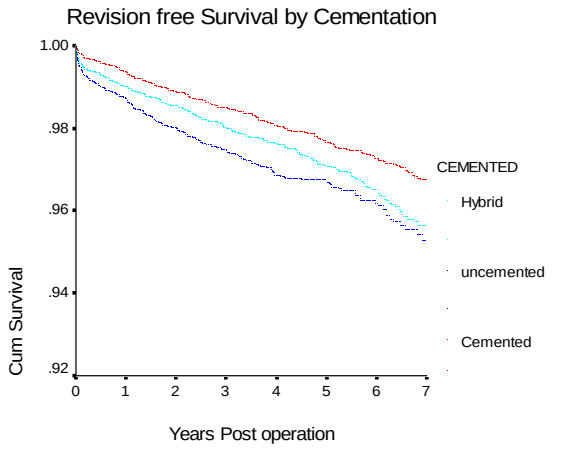
Revision free survival at one year is 99.7%; two years 99.2%; three years 98.8%; four years 98.3%; five years 97.9%; six years 97.4%; seven years 96.6%; eight years 95.3%.

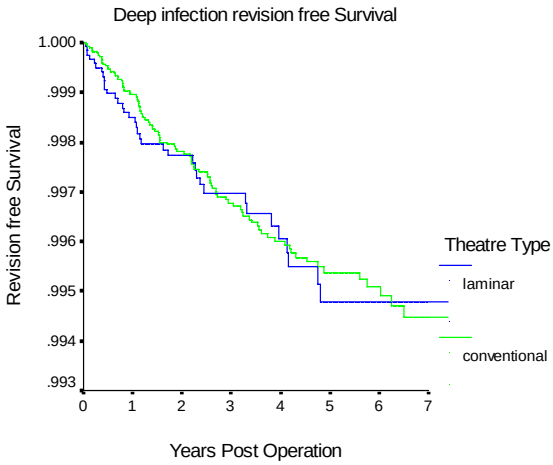

Revision-free survival by Age
Revision-free Survival
1.00
.98
.96
.94
.92
0
1
2
3
4
5
6
Years Post Operation
AGEGRPS
ge75
65_74
55_64
lt55


Deep infection revision free Survival
Revision free survival
1.000
.999
.998
.997
.996
.995
.994
.993
0
1
2
3
4
5
6
7
Year Post Operation
Theatre space suits
Present
Absent


Revision-free Survival by Gender
Revision-free Survival
1.00
.99
.98
.97
.96
.95
0
1
2
3
4
5
6
7
Years Post Operation
SEX
M
F


Dislocation revision free Survival by Approach
Revision free Survival
1.00
.99
.98
0
1
2
3
4
5
6
7
Year Post Operation
Approach
troch
lateral
posterior
anterior


Revision free Survival by Cementation
Cum Survival
1.00
.98
.96
.94
.92
0
1
2
3
4
5
6
7
Years Post operation
CEMENTED
Hybrid
uncemented
Cemented


Deep infection revision free Survival
Revision free Survival
1.000
.999
.998
.997
.996
.995
.994
.993
0
1
2
3
4
5
6
7
Years Post Operation
Theatre Type
laminar
conventional

HIP RE-REVISIONS

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

There were 99 registered primary hip arthroplasties that had been revised twice, 22 that had been revised 3 times and 4 that had been revised 4 times.

Second Revision

Time between first and second revision for the 99 hip arthroplasties averaged 398 days with a range of 2 to 1897 and the standard deviation of 446. This compares to an average of 734 days between primary and first revision arthroplasty.

Reason for revision

Dislocation	36
Deep infection	30
Loosening acetabular	15
Loosening femoral	13
Pain	8
Fracture femur	6
Implant breakage femoral	1
Bone graft dissolution	1
Iatrogenic pelvic diss.	1
Wear acetabular component	1

Revision

Change of acetabular	42
Change of head	33
Change of femoral	31
Change of all	22

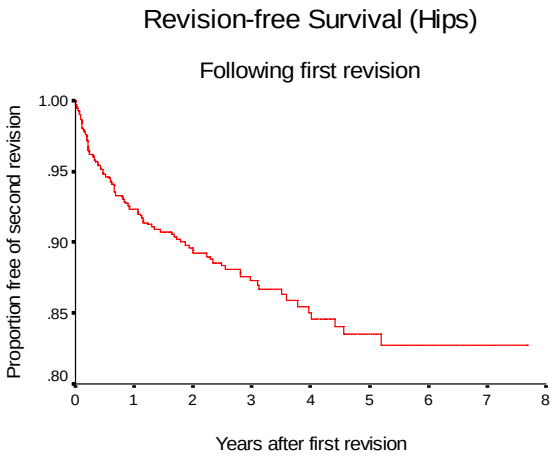
Third Revision

The average time between 2nd and 3rd revisions for the 22 arthroplasties was 415 days with a range from 13 to 1665 and a standard deviation of 399.

Fourth Revision

The average time between the 3rd and 4th revision for the 4 patients was 233 days with a range from 40 to 518 and a standard deviation of 206.

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



The Kaplan Meier graph shows that survival following the first revision is poorer (84% at five years) than for a 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 patients are sent the Oxford 12 questionnaire. There are 12 questions, scoring from 1 to 5. A score of 12 is the best, indicating normal function. A score of 60 is the worst, indicating the most severe disability*.

We have grouped the questionnaire responses based on the scoring system published by Field, Cronin and Singh (2004)

This groups each score into six categories;

Category 1	12 – 17	(excellent)
Category 2	18 – 23	(very good)
Category 3	24 – 29	(good)
Category 4	30 – 35	(fair)
Category 5	36 – 41	(poor)
Category 6>	41	(very poor)

For the eight year period, and as at July 2007, there were 16,541 primary hip questionnaire responses registered at six months post surgery.
The mean hip score was 19.27 (standard deviation 7.50, range 12 – 60)

Scoring	12 – 17	8745
Scoring	18 – 23	4058
Scoring	24 – 29	2008
Scoring	30 – 35	999
Scoring	36 - 41	458
Scoring	> 41	273

At six months post surgery, 77% had an excellent or very good score.

Questionnaires at five years post surgery

A random selection of patients who had a six month questionnaire registered, 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 individual patients.
The number of patients with six month and five year scores was 2,909.

**The authors of the Oxford 12 questionnaire have recently published a change to the scoring system with the scores now ranging from 0 – 48 with 48 being the best outcome. The Registry data will be changed to this new scoring system for next years report.*

At six months post surgery, 81% of patients had achieved an excellent or very good score.
At five years post surgery, 84% of patients had achieved an excellent or very good score.

Analysis of the individual questions at six months and 5 years post surgery

Analysis of the individual questions showed that the most common problems occurred with limping (Q10) putting on socks (Q4) and pain in the operated hip (Q1)

Percentage scoring 4 or 5 for each question (n=16541) at six months, and at five years post surgery (n = 2909)

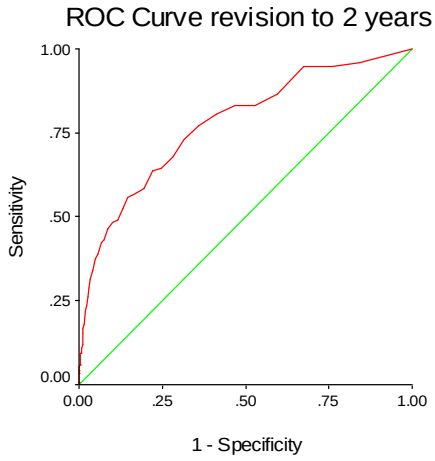
		% 6/12	% 5 yrs
1	Moderate or severe pain from the operated hip	6.2	6.4
2	Only able to walk around the house or unable to walk before pain becomes severe	4.4	2.8
3	Extreme difficulty or impossible to get in and out of a car or public transport	2.0	2.0
4	Extreme difficulty or impossible to put on a pair of socks	9.0	6.0
5	Extreme difficulty or impossible to do the household shopping on your own	3.7	3.1
6	Extreme difficulty or impossible to wash and dry yourself	1.8	1.4
7	Pain interfering greatly or totally with your work	4.1	3.6
8	Very painful or unbearable to stand up from a chair after a meal	2.0	1.5
9	Sudden severe pain most or all of the time	1.3	1.3
10	Limping most or every day	13.3	9.5
11	Extreme difficulty or impossible to climb a flight of stairs	3.7	3.7
12	Pain from your hip in bed most or every nights	4.6	2.6

Relationship of Oxford Score to early revision

Last year we first reported the relationship between the six month Oxford 12 scores and early revision. This has been analysed further for this report and the findings are:

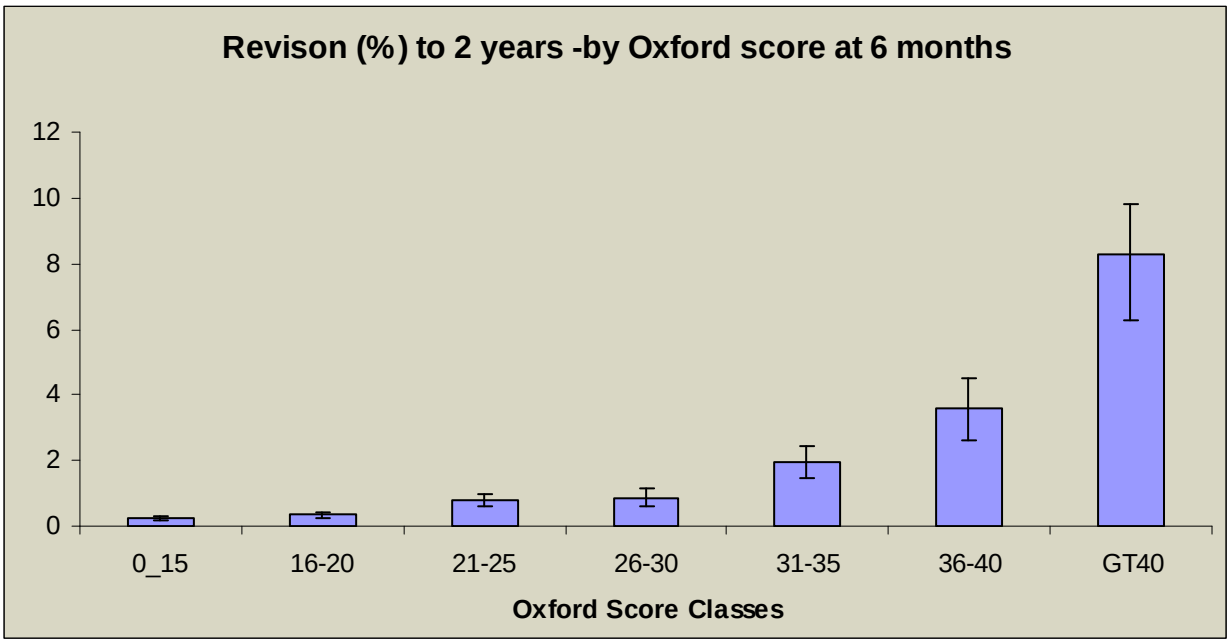
1. For every one unit increase in the oxford score there was an 11% risk of revision within the first 2 years of surgery, a 5% increased risk between 2 and 4 years and a 3% increase between 4 and 6 years (P< 0.001).
2. "A ROC analysis" has demonstrated that a patient with a score greater than 20 has 8 times the risk of needing a revision within 2 years compared to a person with a score equal or less than 20

   Alternatively the ROC analysis predicted 73% of the revisions within 2 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.

3. By plotting the patients scores in groups of 5 against the proportion of hips revised for that same group it demonstrates that there is an incremental increase in the risk during the first 2 years related to the oxford score. A person with a score of greater than 40 has 24 times the risk of a revision compared to a person with a score between 16 and 20.



A patient with score 16-20 has a 0.35% risk of revision within 2 years compared to an 8.25% risk with score >40.

Complication data from the questionnaires
Each questionnaire has a section to report hospitalisation for dislocation, infection, DVT, pulmonary embolism or any other reason. Analysis of the 16,541 questionnaires gave the following numbers of self reported dislocation, infection, deep vein thrombosis and pulmonary embolus for the seven year period.

	Number	Registered revision
Dislocation	280	62
Infection	179	26
DVT	73	N/A
PE	21	N/A

Dislocation: The number of patient reported dislocations within the first 6 months(280)gives an incidence of 1.6% of which 62 (0.37%) have been revised. This figure is very similar to the Registry recorded dislocation revision rate in the first 6mths of 0.4% The revision to dislocation ratio is 1 to 4.45. Seventy three percent of the patient reported dislocations were from the posterior approach, (64% of hip arthroplasty is via the posterior approach).

Infection: the infection information received from the patients questionnaire does not distinguish between superficial and deep infection and it has to be assumed that the majority were superficial, as only 16% subsequently had a revision.

DVT &PE the recorded number of DVT's is obviously far too low and the same probably applies to the PE incidence of 0.12 % even although it is a significant event for most people.

Revision hip questionnaire responses
There were 3,767 revision hip responses with 31% achieving an excellent score. This group includes all revision hip procedures. The mean revision hip score was 24.04 (standard deviation 9.51, range 12 – 59)

KNEE ARTHROPLASTY

PRIMARY KNEE ARTHROPLASTY

The **eight year** report analyses data for the period January 1999 – December 2006. There were 28,705 primary knee procedures registered, an additional 5,151 compared to last year's report.
This includes 64 patello-femoral prostheses with 17 registered in 2006.

1999	2429
2000	3013
2001	3058
2002	2893
2003	3040
2004	4097
2005	5024
2006	5151

As for primary hips registrations have plateaued over the last 2 years with the increase for 2006 being just 2.5%.

DATA ANALYSIS

Age and Sex Distribution

The average age for all patients with primary arthroplasties was 68.94 years, with a range of 8.19 – 100.49 years.

Further analysis is in the following charts.

All knee arthroplasty

	Female	Male
Number	14985	13720
Percentage	52.20	47.80
Mean age	69.28	68.57
Maximum age	100.49	97.32
Minimum age	13.57	8.19
Standard dev.	10.04	9.42

Conventional knee arthroplasty

	Female	Male
Number	14935	13706
Percentage	52.15	47.85
Mean age	69.29	68.57
Maximum age	100.49	97.32
Minimum age	13.57	8.19
Standard dev.	10.03	9.42

Patello-femoral arthroplasty

	Female	Male
Number	50	14
Percentage	78.13	21.87
Mean age	64.07	64.01
Maximum age	85.78	78.62
Minimum age	31.96	53.20
Standard dev.	11.51	6.92

Previous operation

None	23835
Menisectomy	2806
Osteotomy	622
Arthroscopy/debridement	487
Ligament reconstruction	245
Internal fixation for juxtarticular fracture	180
Patellectomy	120
Synovectomy	65
Removal of loose body	22
Other	46

Diagnosis

Osteoarthritis	26463
Rheumatoid arthritis	996
Post fracture	321
Other inflammatory	297
Post ligament disruption /reconstruction	180
Avascular necrosis	104
Tumour	29
Other	47

Approach

Medial parapatellar	25411
Other	903
Lateral parapatellar	567
Image guided surgery	568
Minimally invasive surgery	49

Image guided surgery was added to the updated forms at the beginning of 2005 and the number of procedures done this way increased by 181% during 2006. This accounted for 7.1% of the total number of procedures during 2006, a big increase from the 0.3% in 2005.

Similarly MIS numbers have more than doubled in the last year but are still very few.

Bone graft

Femoral autograft	30
Femoral allograft	6
Femoral synthetic	1
Tibial autograft	26
Tibial allograft	7

Cement

Femur cemented	25406	89%
Antibiotic in cement	15200	60%
Tibia cemented	27128	95%
Antibiotic in cement	15866	58%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	27034	94%

A cephalosporin was used in 95% of arthroplasties.

Operating theatre

Conventional	18727
Laminar flow	9620
Space suits	6000

Approximately one third of arthroplasties have been carried out in Laminar Flow Theatres with space suits used in 20% of procedures.

ASA Class

This was introduced with the updated forms at the beginning of 2005.
There are 7411/10175 (73%) 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

Analysis of ASA class and age

ASA	Number	Percentage	Mean age
1	782	Mean age	62.72
2	4679	Mean age	68.12
3	1904	Mean age	71.11
4	46	Mean age	71.41

63% of the procedures were ASA class 2

Analysis of ASA class and public versus private hospitals

ASA	% Public	%Private
1	6	16
2	63	63
3	30	20
4	0.7	0.5

As with hip patients those with greater co-morbidities tend to have their surgery in the public hospitals.

Operative time (skin to skin)

Mean	85 minutes
Standard deviation	26 minutes
Minimum	25 minutes
Maximum	420 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. Therefore the following data is for 2005 only.

Consultant	8929
Advanced trainee supervised	659
Advanced trainee unsupervised	128
Basic trainee	281

The number of recorded supervised advanced trainees doubled in 2006 and more than doubled for unsupervised advanced and basic trainees.

Prosthesis usage

Patello-femoral

Avon-patello	59
LCS PFJ	3
Mod 3	1
Themis	1

There are 64 patello-femoral procedures registered to 29 surgeons. Avon- patello is the most common prosthesis at 92% of the total.

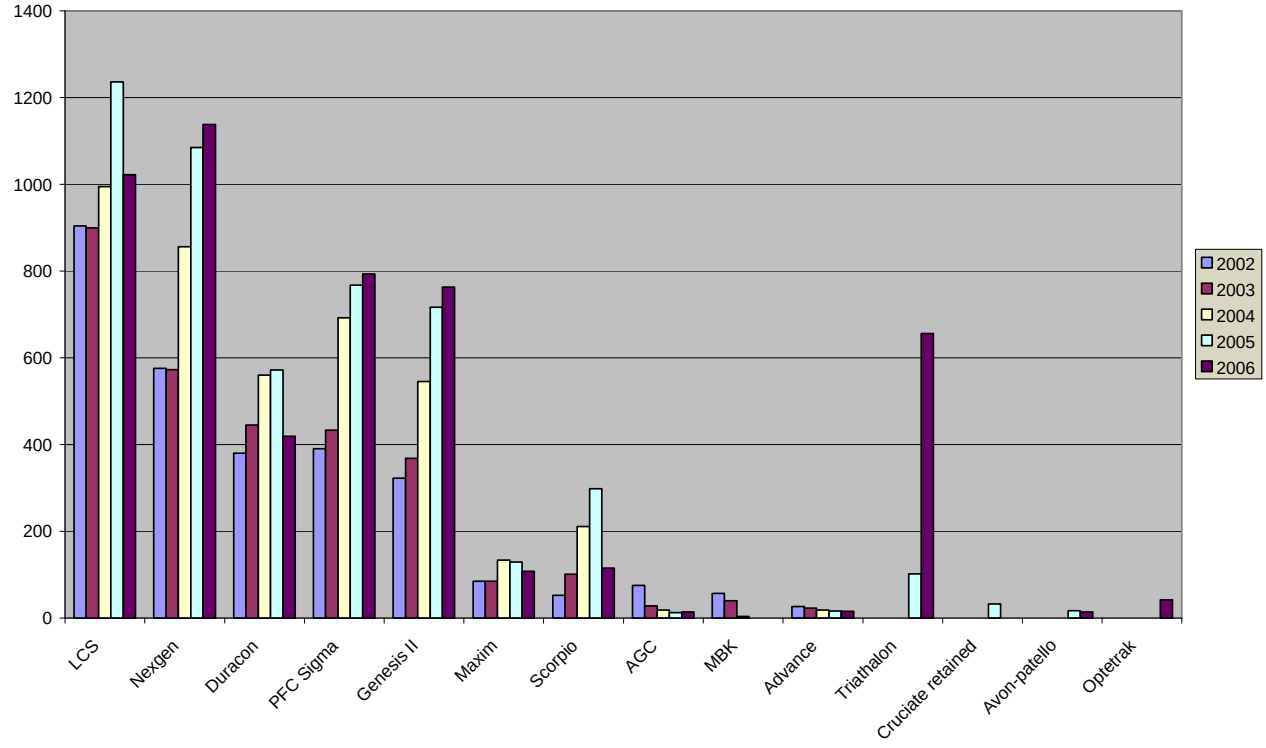
Top 10 Conventional Knee Prostheses used in 2006

Nexgen	1138
LCS Complete	1022
PFC Sigma	793
Genesis II	763
Triathlon	656
Duracon	419

Scorpio	115
Maxim	108
Optetrak	42
Advance	15

During 2006 LCS was overtaken by Nexgen, the Triathlon made spectacular gains and Optetrak made its first appearance.

MOST USED KNEE PROSTHESES 2002-2006



Patellar resurfacing
8,742 (31%) of the conventional knee procedures were registered with the patella resurfaced and 19899 (69%) were not resurfaced. These figures remained unchanged.

Surgeon and hospital workload

Surgeons
In 2006, 173 surgeons performed 5,151 total knee replacements, an average of 30 procedures per surgeon.
26 surgeons performed less than 10 procedures and 43 performed more than 40.

Hospitals
In 2006 primary knee replacement was performed in 50 hospitals. 26 were public hospitals and 24 were private.

For 2006 the average number of total knee replacements per hospital was 103.

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 eight year period January 1999 – December 2006, there were 2,499 revision knee procedures registered. This is an additional 350 compared to last year's report.

The average age for a female with a revision knee replacement was 70.61 and a male was 70.00 years.

Revision knees

	Female	Male
Number	1197	1302
Percentage	47.89	52.11
Mean age	70.61	70.00
Maximum age	95.79	98.39
Minimum age	18.73	15.49
Standard dev.	10.52	9.78

The percentage of revision knees to primary knees is unchanged at 8% ie for every 100 knee arthroplasties performed 8 will be a revision procedure.

Analysis of data for revision knees that had the primary operation prior to 1999 has not been undertaken this year. Instead the focus has been on a more in-depth analysis of the revision of registered primary knees.

REVISION OF REGISTERED PRIMARY KNEE ARTHROPLASTY

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

There were 520 revisions of the ***28641*** primary replacements (1.8%) and 2 revisions of the 64 patello-femoral prostheses (3.1%), a total of 522.

Time to revision

Mean	750 days
Maximum	2707 days
Minimum	1 day
Standard deviation	576 days

Reason for revision

Pain	174
Deep infection	133
Primary patellar comp.	116
Loosening tibial component	106
Loosening femoral component	58
Instability	40
Stiffness	16
Dislocation component	14
Malalignment	9
Wear component	9
Fracture femur	8
Fracture tibia	7
Loosening patellar	6
Implant breakage tibial	5
Osteolysis	3
Implant breakage femur	2
Other	10

Analysis by time of the 4 main reasons for revision

Pain n = 174

< 6 months	10
6 months – 1 year	31
>1 – 2 years	64
>2 – 3 years	30
>3 – 4 years	21
>4 – 5 years	12
>5 – 6 years	3
>6 – 7 years	3
>7 – 8 years	0

Deep infection n = 133

< 6 months	23
6 months – 1 year	33
>1 – 2 years	41
>2 – 3 years	13
>3 – 4 years	13
>4 – 5 years	4
>5 – 6 years	2
>6 – 7 years	3
>7 – 8 years	1

Addition of patellar component n = 116

< 6 months	6
6 months – 1 year	28
>1 – 2 years	44
>2 – 3 years	22
>3 – 4 years	10
>4 – 5 years	3
>5 – 6 years	1
>6 – 7 years	2
>7 – 8 years	0

Loosening tibial component n = 106

< 6 months	6
6 months – 1 year	12
>1 – 2 years	18
>2 – 3 years	26
>3 – 4 years	16
>4 – 5 years	13
>5 – 6 years	9
>6 – 7 years	5
>7 – 8 years	1

Patellar resurfacing

As noted previously, 69 %(19,899) of the 28,641 conventional primary knees registered were not resurfaced and 31% (8,742) were resurfaced.
Of the group that was not resurfaced 71 (0.36%) had the patella later resurfaced as the only revision

procedure and a further 45 had the patella resurfaced as part of other component revision

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

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

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

Revision of Knee Prostheses

Component	Total	Number revised	Observed component years	Rate/100 component years	Exact 95% confidence interval
AGC	364	5	1795	0.3	0.09, 0.65
Duracon cemented	2996	32	10494	0.3	0.21, 0.43
Duracon uncemented	678	10	2785	0.4	0.17, 0.66
Genesis II cemented	3352	54	9012	0.6	0.45, 0.78
Insall/Burstein	249	29	1510	1.9	1.29, 2.76
LCS Complete cemented	2588	24	4632	0.5	0.33, 0.77
LCS Complete uncemented	938	17	1427	1.2	0.69, 1.91
LCS cemented	3575	105	18790	0.6	0.46, 0.68
LCS uncemented	1090	58	5566	1.0	0.79, 1.35
MBK	222	9	1090	0.8	0.38, 1.57
Maxim	768	6	2562	0.2	0.09, 0.51
Nexgen LPS cemented	1636	34	4747	0.7	0.50, 1.00
Nexgen LPS-Flex cemented	1123	12	1598	0.8	0.39, 1.31
Nexgen cemented	2832	36	10747	0.3	0.23, 0.46
Nexgen uncemented	269	6	1161	0.5	0.19, 1.12
PFC Sigma cemented	3660	51	10171	0.5	0.37, 0.66
Scorpio	830	20	1871	1.1	0.65, 1.65

The above table contains analyses of knee prostheses that have a minimum of 200 registered procedures and 1000 observed component years.

The only “standout” is the Insall Burstein but these are no longer being implanted.

.Revision rates vs Fixation

Fixation	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval	
Cemented	25253	80383	421	0.52	0.47, 0.58	C v UN P=<0.0001
Uncemented	1360	4764	58	1.22	0.92, 1.57	Un v Hy P=<0.0001
Hybrid	2028	7532	41	0.54	0.39, 0.74	C v Hy P=0.72
Overall	**28641**	**92679**	**520**	**0.56**	**0.52 – 0.61**	

Fully cemented and hybrid knees have significantly lower revision rates than fully uncemented. The data has not been broken down into age groups because of the small numbers of fully uncemented compared to cemented knees.

Revision Rates vs Age Bands

Age	Total	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
<55	2270	7401	78	1.05	0.83, 1.32
55-64	7253	23082	176	0.76	0.65, 0.88
65-74	10713	35504	186	0.52	0.45, 0.60
>74	8405	26693	80	0.30	0.24, 0.37

Theatre Type vs Revision for Deep Infection

Theatre	Space suit	Total	Observed component years	Number revised for deep infection	Rate/100 component years	Exact 95% confidence interval
Conventional	No	17376	63554	84	0.13	0.11, 0.16
	Yes	1269	2345	2	0.09	0.01, 0.31
Laminar flow	No	5047	13444	21	0.16	0.10, 0.24
	Yes	4560	11781	24	0.20	0.13, 0.30

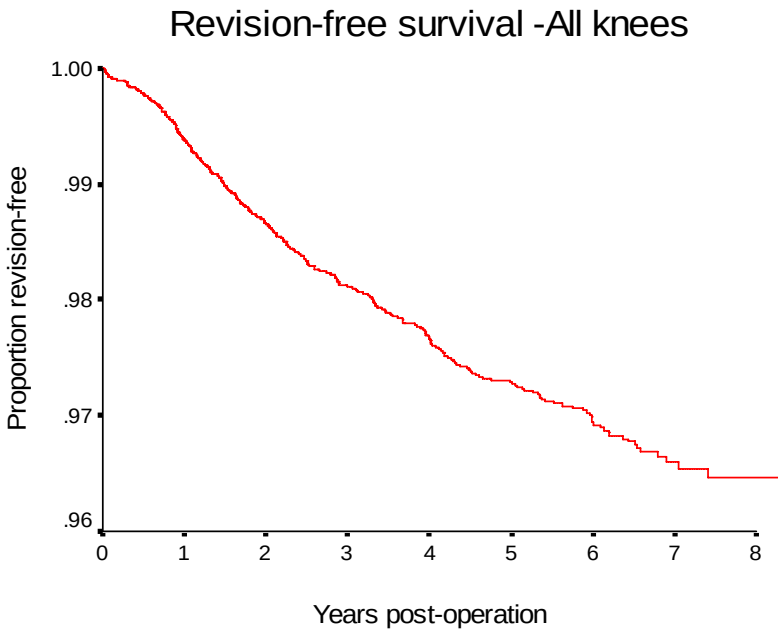
Surgeon Annual Workload vs Revision

Operations per annum	Number of operations	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
<10	699	2346	17	0.7	0.42, 1.16
10-24	7439	25412	163	0.6	0.55, 0.75
25-29	14650	46410	235	0.5	0.44, 0.58
50-74	2226	6984	40	0.6	0.41, 0.78
75-99	1839	5636	9	0.2	0.07, 0.30
>99	9	11	0	0.0	

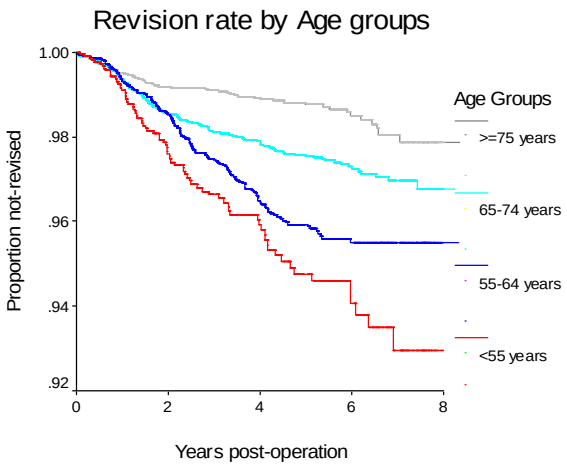
P values show there is a significant difference in rate per 100 component years for those surgeons performing greater than 74 primary knee arthroplasties per year.

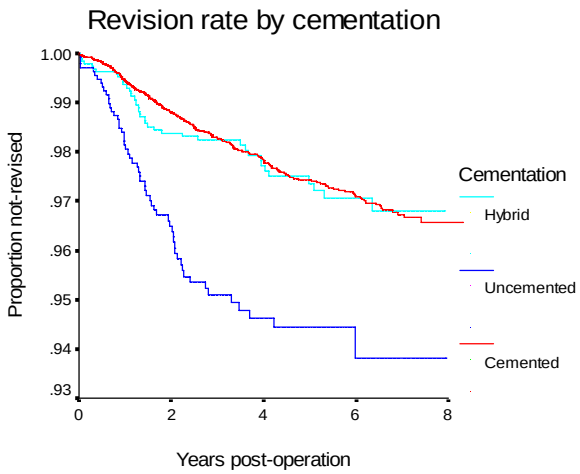
KAPLAN MEIER CURVES

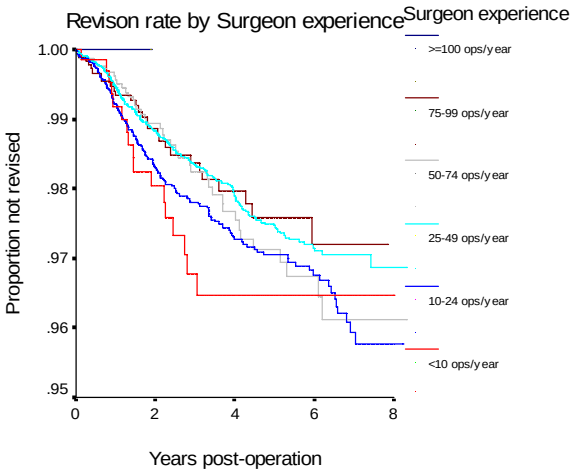
The following Kaplan Meier survival analyses are for years 1999 to 2006 with deceased patients censored at time of death.

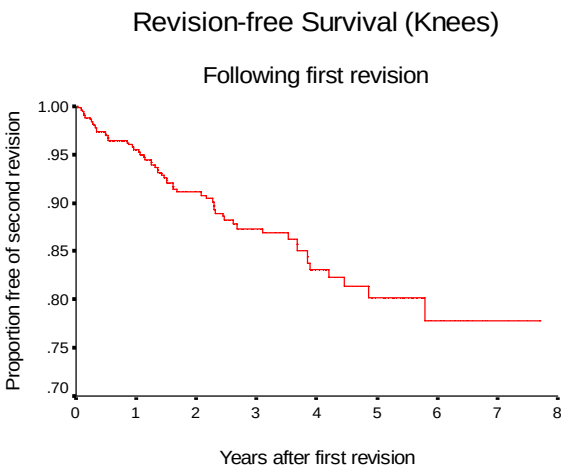


Survival at one year 99.7%; two years 98.8%; three years 98.3%; four years 97.8% five years 97.4%; six years 97.0%; seven years 96.6%; eight years 96.4%.









Knee re-revisions
Analysis was undertaken of 2 groups of re-revisions.

There were 58 registered primary knee revisions that had been revised twice and 2 that had been revised 3 times. None had been revised 4 times.

Second revision
Time between the first and second revision for the 57 knee arthroplasties averaged 620 days, with a range of 4 – 2114 and a standard deviation of 512 days. This compares to an average of 750 days between primary and first revision arthroplasty.

Reason for revision

Deep infection	18
Loosening tibial component	16
Pain	13
Loosening femoral component	9
Instability	8
Dislocation	4
Stiffness	2
Patellar fracture	2

As for hips the Kaplan Meier graph is much steeper when compared to primary joints.

Third revision
The average time between 2nd and 3rd revisions for the 2 arthroplasties was 686 days, with a range of 448 – 924.

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

Questionnaires at six months post surgery
At six months post surgery patients are sent the Oxford 12 questionnaire. There are 12 questions, scoring from 1 to 5. A score of 12 is the best, indicating normal function. A score of 60 is the worst, indicating the most severe disability*.
The questionnaire responses are grouped into six categories as per Field Cronin & Singh (2004).

Category 1	12 – 17	(excellent)
Category 2	18 – 23	(very good)
Category 3	24 – 29	(good)
Category 4	30 – 35	(fair)
Category 5	36 – 41	(poor)
Category 6	> 41	(very poor)

For the eight year period and as at July 2007, there were 12,521 primary knee questionnaire responses registered at six months post surgery.
The mean knee score was 23.02 (standard deviation 8.36, range 12 – 60)

Scoring	12 – 17	3779
Scoring	18 – 23	3830
Scoring	24 – 29	2374
Scoring	30 – 35	1337
Scoring	36 – 41	757
Scoring	> 41	444

At six months post surgery, 61% had an excellent or very good score.

**The authors of the Oxford 12 questionnaire have recently published a change to the scoring system with the scores now running from 0 – 48 with 48 being the best outcome. The Registry data will be changed to this new scoring system for next years report.*

Questionnaires at five years post surgery
A random selection of patients who had a six month questionnaire registered, 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 individual patients.

The number of patients with six month and five year scores was 2,694.

At six months post surgery, 63% of patients had achieved an excellent or very good score and had a mean of 22.47.

At five years post surgery, 71% of patients had achieved an excellent or very good score and had a mean of 20.86.

The group of patients who had six month primary scores and subsequent revision scores were also analysed. The number with both these scores was 222.
At six months post surgery, only 29.27% of this group achieved an excellent or very good score. The mean was 31.40.
The revision scores for this group had a mean of 30.21 and 28.82% achieved an excellent or very good score.

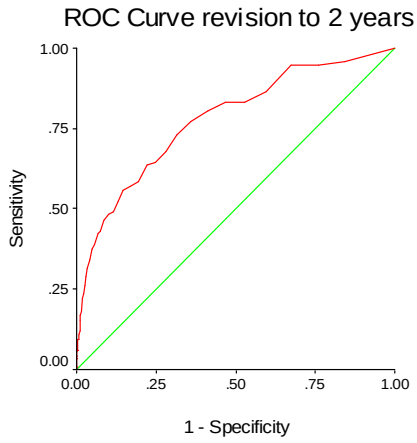
Analysis of the individual questions at six months and 5 years post surgery
Analysis of the individual questions showed that the most common problems occurred with kneeling (Q4), pain in the operated knee (Q1) and limping (Q10)

Percentage scoring 4 or 5 for each question out of the group of 12,521 primary knee responses at six months and 2,702 at five years.

		% 6/12	% 5 yrs
1	Moderate or severe pain from the operated knee	13.7	9.5
2	Only able to walk around the house or unable to walk before pain becomes severe	6.0	4.7
3	Extreme difficulty or impossible to get in and out of a car or public transport	4.9	4.7
4	Extreme difficulty or impossible to kneel down and get up afterwards	43.7	43.8
5	Extreme difficulty or impossible to do the household shopping on your own	4.3	5.7
6	Extreme difficulty or impossible to wash and dry yourself	1.3	2.1
7	Pain interfering greatly or totally with your work	5.9	5.0
8	Very painful or unbearable to stand up from a chair after a meal	3.9	2.5
9	Most of the time or always feeling that the knee might suddenly “give way”	2.3	2.0
10	Limping most or every day	12.2	9.5
11	Extreme difficulty or impossible to climb a flight of stairs	8.0	8.1
12	Pain from your knee in bed most or every nights	9.9	5.0

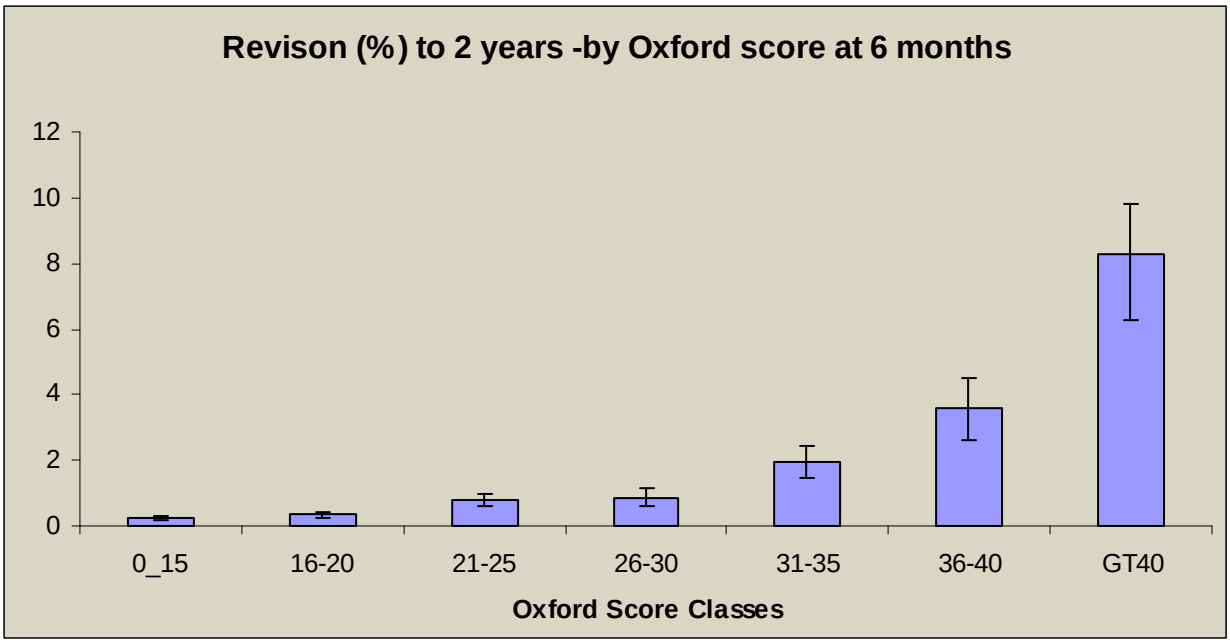
Relationship to Oxford Score to early revision
Last year we first reported the relationship between the six month Oxford 12 scores and early revision. This has been analysed further for this report and the findings are:

1. For every one unit increase in the oxford score there was a 12% risk of revision within the first 2 years following surgery, a 6% increased risk between 2 and 4 years and a 4% increase between 4 and 6 years (P<0.001).
2. “A ROC analysis” has demonstrated that a patient with an oxford score greater than 28.5 has 8 times the risk of needing a revision within 2 years compared to a person with a score equal or less than 28.5. Alternatively the ROC analysis predicted 73% of the revisions within 2 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

3. By plotting the patients scores in groups of 5 against the proportion of knees revised for that same group it demonstrates that there is an incremental increase in the risk during the first 2 years related to the oxford score. A patient with a score greater than 40 has 27 times the risk of a revision within 2 years compared to a person with a score between 16 and 20.



Complication data from the questionnaires
Each questionnaire has a section to report hospitalisation for dislocation, infection, DVT, pulmonary embolism or any other reason. Analysis of the 12,521 questionnaires gave the following numbers of self reported dislocation, infection, DVT and pulmonary embolus for the eight year period.

	Number	Registered revision
Infection	337	21
Dislocation	81	6
Manipulation	129	N/A
DVT	29	N/A
PE	14	N/A

Infection
As noted in previous reports there is no differentiation between superficial and deep infection. Twenty one are recorded as having had revisions within six months of the primary procedure.

Dislocation
Eighty one patients reported dislocation but from the low registered revision number it is assumed that most patients are reporting a feeling of instability.

MUA
The reported number gives an incidence of 1.1% which has remained static.

PE
The reported incidence is 0.11% the same as previous years and similar to the hip incidence but probably too low.

Revision knee questionnaire responses
There were 1,604 revision knee responses with only 40% achieving an excellent or very good score. This group includes all revision knee responses. The mean revision knee score was 27.87 (standard deviation 10.35, range 12 – 58)

UNICOMPARTMENTAL KNEE ARTHROPLASTY

PRIMARY UNICOMPARTMENTAL KNEE ARTHROPLASTY

The **seven** year report analyses data for the period January 2000 – December 2006. There were 3,709 unicompartmental knee procedures registered, an additional 584 compared to last year's report.

2000	340
2001	430
2002	533
2003	630
2004	634
2005	558
2006	584

DATA ANALYSIS

Age and Sex Distribution

The average age for a unicompartmental knee replacement was 66.59 years, with a range of 35.19 – 94.71.

	Female	Male
Number	1762	1947
Percentage	47.50	52.50
Mean age	66.64	66.56
Maximum age	94.71	93.42
Minimum age	35.19	35.24
Standard dev.	10.13	8.96

Previous operation

None	2925
Menisectomy	557
Arthroscopy/debridement	168
Ligament reconstruction	11
Osteotomy	10
Patellectomy	9
Internal fixation	7
Arthrotomy	2
Removal of loose body	2
Synovectomy	1

Diagnosis

Osteoarthritis	3585
Avascular necrosis	34
Post ligament disruption	15
Other inflammatory	14
Post fracture	11
Rheumatoid arthritis	9
Other	3

Approach

Medial	3095
Minimally invasive surgery	612
Other	132
Lateral	87
Image guided surgery	5

Image guided surgery was added to the updated forms at the beginning of 2005

As for 2005, 30% of the 2006 procedures were performed via the minimally invasive approach. However unlike TKA there has been minimal interest in image guided surgery.

Cement

Femur cemented	3497	94%
Antibiotic in cement	2003	57%
Tibia cemented	3502	94%
Antibiotic in cement	2002	57%

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic	3555	96%

Operating theatre

Conventional	2969
Laminar flow	678
Space suits	712

ASA Class

This was introduced with the updated forms at the beginning of 2005.
There are 885/1142 (77%) 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	No.	%	Mean age
1	163	18	62.43
2	597	67	65.70
3	122	14	70.16
4	3	1	65.67

85% of patients were ASA class 1 or 2 which is higher than for TKA (74%).

Operative time (skin to skin)

Mean	83 minutes
Standard deviation	24 minutes
Minimum	23 minutes
Maximum	195 minutes

Surgeon grade

The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised. The numbers below are for 2005 and 2006.

Consultant	1074
Advanced trainee supervised	50
Advanced trainee unsupervised	5
Basic trainee	5

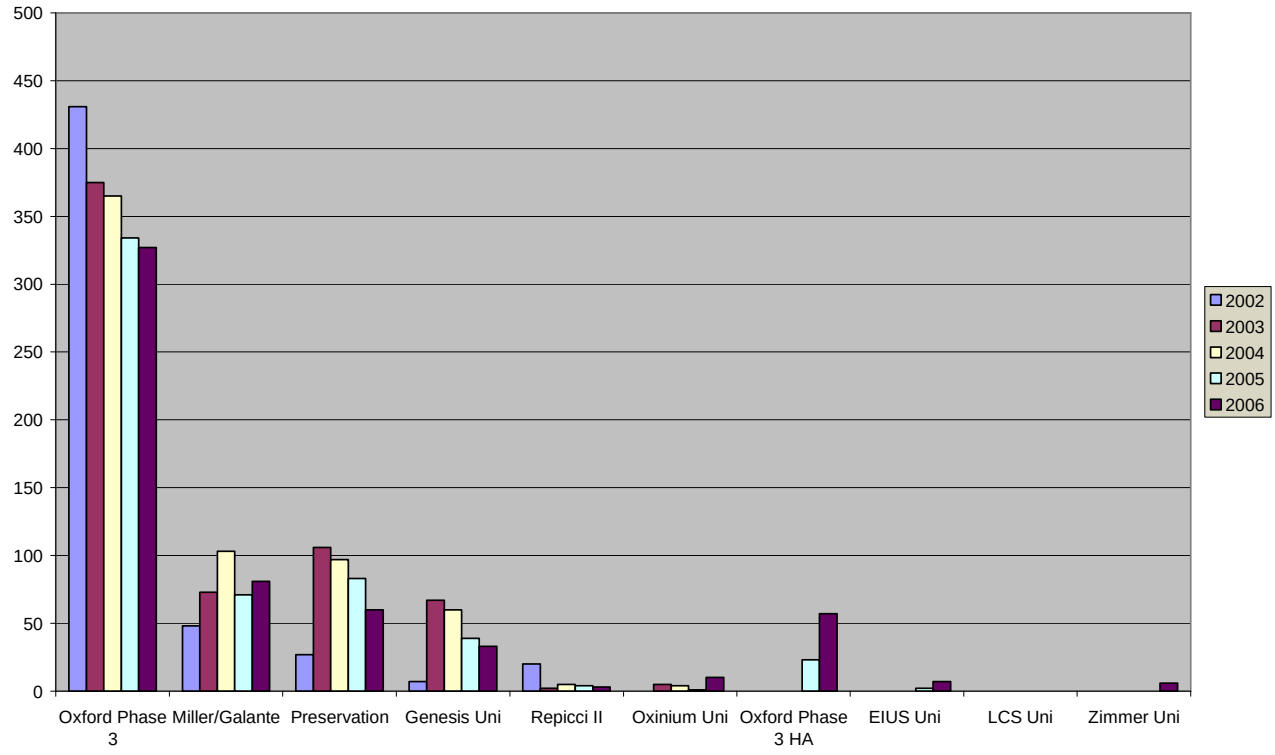
Prosthesis usage

Unicompartmental knee prostheses used in 2006

Oxford Phase 3	327
Miller/Galante	81
Preservation	60
Oxford Phase 3 HA	57
Genesis Uni	33
Oxinium Uni	10
EIUS Uni	7
Zimmer Uni	6
Repicci II	3

The Oxford Phase 3 accounts for 56% of prostheses used.

MOST USED UNICOMPARTMENTAL PROSTHESES 2002-2006



Surgeon and hospital workload

Surgeons
In 2006, 81 surgeons performed 584 unicompartmental knee replacements, an average of 7 procedures per surgeon.
35 surgeons performed fewer than 5 procedures and 10 performed more than 15 procedures.
The number of surgeons increased by 10 in 2006 and the average fell from 8 to 7 procedures per surgeon.

Hospitals
In 2006 unicompartmental knee replacement was performed in 39 hospitals. 19 were public and 20 were private.

For 2006 the average number of unicompartmental knee replacements per hospital was 15.

REVISION OF REGISTERED UNICOMPARTMENTAL KNEE ARTHROPLASTY
This section analyses the data for revision of unicompartmental knee replacement over the seven year period.

There were 187 revisions of the 3709 registered unicompartmental knees (5.04%) and 18 re-revisions, giving a total of 205 revisions.
159 of the 187 (85%) were revised to total knee replacements.

Time to revision

Mean	687 days
Maximum	2149 days
Minimum	10 days
Standard deviation	480 days

Reason for revision

Pain	91
Loosening tibial component	47
Loosening femoral component	29
Bearing dislocation	13
Progression of disease	12
Deep infection	11
Fracture tibia	8
Wear tibial	6
Impingement	3
Implant breakage	2
Other	9

Analysis by time of the 3 main reasons for revision

Pain n = 91

< 6 months	6
6 months – 1 year	16
> 1 – 2 years	36
> 2 – 3 years	16
>3 – 4 years	6
> 4 – 5 years	9
>5 – 6 years	2
>6 – 7 years	0

Pain accounted at least in part for 49% of revisions and deep infection 6%. It is likely that progression of disease (6%) is under reported as some revised for pain are probably because of disease progression.

Loosening tibial component n = 47

< 6 months	5
6 months – 1 year	8
> 1 – 2 years	22
> 2 – 3 years	4
>3 – 4 years	5
> 4 – 5 years	2
>5 – 6 years	1
>6 – 7 years	0

Loosening femoral component n = 29

< 6 months	0
6 months – 1 year	7
> 1 – 2 years	13
> 2 – 3 years	2
>3 – 4 years	6
> 4 – 5 years	1
>5 – 6 years	0
>6 – 7 years	0

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

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

Rate/100 Component Years –
This is equivalent to the yearly revision rate expressed as a percent and is derived by dividing the number of prostheses revised by the observed component years multiplied by 100. It therefore allows for the number of years of postoperative follow-up in calculating the revision rate. These rates are usually very low hence it is expressed per 100

component years rather than per component year. Statisticians consider that this is a more accurate way of deriving a revision rate for comparison when analysing data with widely varying follow-up times. It is also important to note the ***confidence*** **intervals** – the closer they are to the estimated revision rate/100 component years the more precise the estimate is.

Unicompartmental Prostheses

Uni Compartmental	Total Number	Number Revised	Observed Component Years	Rate/100 component years	Exact 95% confidence interval
EIUS	9	0	5	0.0	
Genesis Uni	235	17	621	2.7	1.59, 4.37
LCS	6	2	30	6.6	0.80, 23.78
Miller/Galante	543	25	1739	1.4	0.93, 2.12
Oxford Phase 3	2335	103	7390	1.3	1.13, 1.69
Oxford Phase 3 HA	80	0	56	0.0	0.0, 6.64
Oxinium Uni	20	3	28	10.7	2.21, 31.39
Preservation	379	17	870	1.9	1.13, 3.12
Repicci II	96	5	448	1.1	0.36, 2.60
Zimmer	3709	172	11189	1.5	1.32, 2.61
Total	**3709**	**172**	**11189**	**1.54**	**1.32, 1.78**

The standouts are the Oxinium and LCS Unis but each has a very small number of OCYs and very wide confidence intervals.

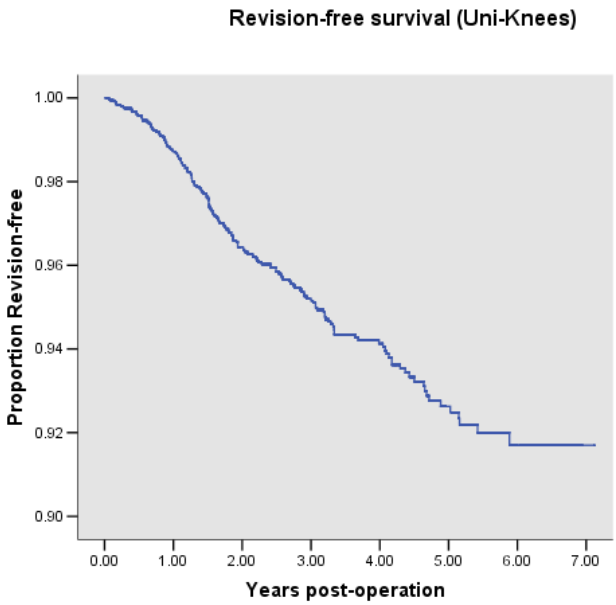
Surgeon Annual Workload versus Revisions

Operations per annum	Number of operations	Observed component years	Number revised	Rate/100 component years	Exact 95% confidence interval
< 2	60	196	7	3.6	1.44, 7.36
2-7	1008	3070	70	2.3	1.78, 2.88
8-11	1057	3309	41	1.2	0.89, 1.68
> 11	1570	4578	53	1.2	0.87, 1.51
Total	**3695**	**11153**	**171**	**1.5**	**1.31, 1.78**

8-11 and > 11 are significantly lower than 2 to 7 or <2 ($p<0.05$)

KAPLAN MEIER CURVES

The following Kaplan Meier survival analyses are for seven years 2000 to 2006 with deceased patients censored at time of death.



Survival at one year 98.7; two years 96.4; three years 95.1; four years 94.1; five years 92.6
There are insufficient numbers for accurate percentage survival beyond 5 years.

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

Questionnaires at six months post surgery

At six months post surgery patients are sent the Oxford 12 questionnaire. There are 12 questions, scoring from 1 to 5. A score of 12 is the best, indicating normal function. A score of 60 is the worst, indicating the most severe disability*.

This year we have grouped the questionnaire responses into six categories;

Category 1	12 – 17	(excellent)
Category 2	18 – 23	(very good)
Category 3	24 – 29	(good)
Category 4	30 – 35	(fair)
Category 5	36 – 41	(poor)
Category 6	> 41	(very poor)

For the seven year period and as at July 2007, there was 2628 unicompartmental knee questionnaire responses registered at six months post surgery. The mean unicompartmental knee score was 21.37 (standard deviation 7.79, range 12 – 57)

*The authors of the Oxford 12 questionnaire have recently published a change to the scoring system with the scores now running from 0 – 48 with 48 being the best outcome. The Registry data will be changed to this new scoring system for next years report

Scoring 12 – 17	1049
Scoring 18 – 23	741
Scoring 24 – 29	437
Scoring 30 – 35	230
Scoring 36 – 41	112
Scoring > 41	59

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

Analysis of the individual questions

Analysis of the individual questions showed that the most common problems occurred with kneeling (Q4), pain in the operated knee (Q1) and limping (Q10).

Percentage scoring 4 or 5 for each question (n = 2628)

1	Moderate or severe pain from the operated knee	12.4
2	Only able to walk around the house or unable to walk before pain becomes severe	3.8
3	Extreme difficulty or impossible to get in and out of a car or public transport	2.1
4	Extreme difficulty or	34.1

	impossible to kneel down and get up afterwards	
5	Extreme difficulty or impossible to do the household shopping on your own	1.7
6	Extreme difficulty or impossible to wash and dry yourself	0.5
7	Pain interfering greatly or totally with your work	3.6
8	Very painful or unbearable to stand up from a chair after a meal	3.9
9	Most of the time or always feeling that the knee might suddenly "give way"	1.8
10	Limping most or every day	10.5
11	Extreme difficulty or impossible to climb a flight of stairs	4.1
12	Pain from your knee in bed most or every nights	8.4

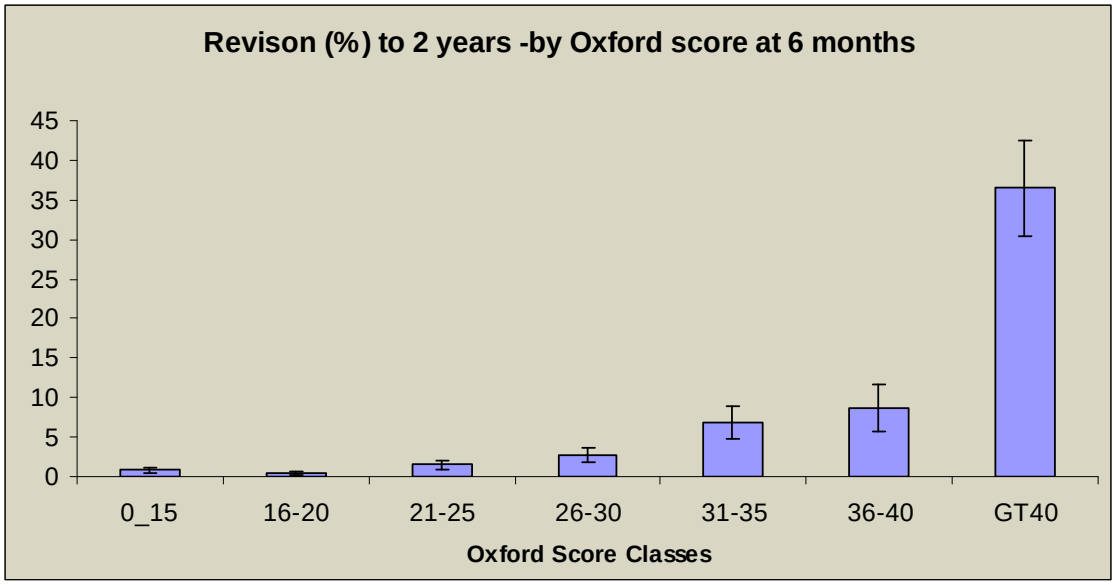
Questionnaires at five years post surgery
Persons who had had a unicompartmental arthroplasty and who had not had revision surgery were sent a further questionnaire at five years post surgery.

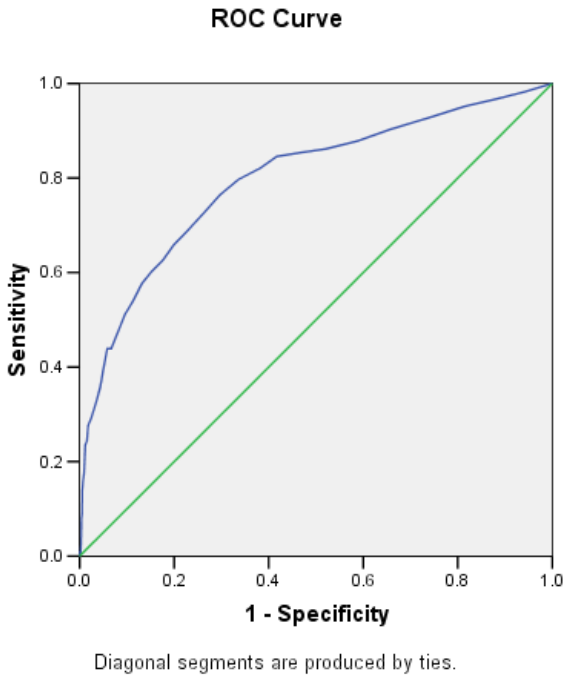
The number of patients with six month and five year scores was 176. At six months post surgery 69% of patients had achieved an excellent or very good score and had a mean of 20.38. At five years post surgery 79% had achieved an excellent or very good score and had a mean of 19.15.

Relationship of Oxford Score to early revision
In view of the statistically significant relationship between six month Oxford scores and early revision for primary total knee arthroplasty a similar analysis was performed for unicompartmental arthroplasty although the arthroplasty numbers are much smaller.

1. By plotting the patients scores in groups of 5 against the proportion of knees revised for that same group it demonstrates that there is an incremental increase in the risk during the first 2 years related to the Oxford Score. A patient with a score greater than 40 has 69 times the risk of a revision compared to a person with a score between 16 and 20.

8 A ROC analysis has demonstrated that a patient with a 6 month Oxford score greater than 24 has 7.5 times the risk of needing a revision within 2 years compared to a person with a score equal or less than 24. Alternatively the ROC analysis predicted 73% of the revisions within 2 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.

Complication data from the questionnaires
Each questionnaire has a section to report hospitalisation for dislocation, infection, DVT, pulmonary embolism or any other reason.
Analysis of the 2628 questionnaires gave the following numbers of self reported dislocation, infection, DVT and pulmonary embolus for the seven year period.

	Number	Registered revision
Infection	44	5
Dislocation	24	10
Manipulation	8	N/A
Haematoma	6	N/A
DVT	4	N/A
PE	3	N/A

Dislocation: Of the 24 reported dislocations 14 were Oxford, 4 MG, 4 Preservation and 2 Genesis. Ten of the 24 are recorded as having been revised.

Pulmonary Embolism
No PE's have been reported for the last two years with a recorded incidence now dropping to 0.1%. As for the other arthroplasties the incidence does seem too low despite it being a significant event.

Revision unicompartmental questionnaire responses
There were 20 responses from the 31 unicompartmental procedures that were revised to new unicompartmental components. The questionnaire responses for these revision procedures had a mean of 23.9 (range 13 – 37)

ANKLE ARTHROPLASTY

PRIMARY ANKLE ARTHROPLASTY

The **seven** year report analyses data for the period January 2000 – December 2006. There were 298 primary ankle procedures registered, an additional 81 compared to last year's report.

2000	17
2001	28
2002	28
2003	26
2004	48
2005	70
2006	81

During 2006 there was a 15% increase in the number of procedures which compares with 49% for the previous year.

DATA ANALYSIS

Age and Sex Distribution

The average age for an ankle replacement was 64.51years, with a range of 32.51 – 84.85 years.

	Female	Male
Number	115	183
Percentage	38.59	61.41
Mean age	62.54	65.74
Maximum age	81.80	84.85
Minimum age	32.51	41.10
Standard dev.	9.41	8.34

Previous operation

None	233
Internal fixation for juxtarticular fracture	29
Arthroscopy/debridement	12
Arthrodesis	9
Osteotomy	5
ORIF	3
Fusion	2
Reconstruction/repair	2
Other	1

Diagnosis

Osteoarthritis	212
Post trauma	57
Rheumatoid arthritis	33
Other inflammatory	2
Other	5

Approach

Anterior	255
Anterolateral	25
Other	6

Bone graft

Tibia autograft	23
Talus autograft	5
Talus allograft	1

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 286 (96%)

Operating theatre

Conventional	196
Laminar flow	100
Space suits	28

ASA Class

This was introduced with the updated forms at the beginning of 2005. There are 96/151 (64%) 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 3A patient with severe systemic disease that limits activity but is not incapacitating
ASA class 4A patient with an incapacitating disease that is a constant threat to life

ASA	No.	%	Mean age
1	28	29	59.25
2	53	55	63.00
3	14	15	71.07
4	1	1	67.00

Operative time (skin to skin)

Mean	135 minutes
Standard deviation	38 minutes
Minimum	50 minutes
Maximum	255 minutes

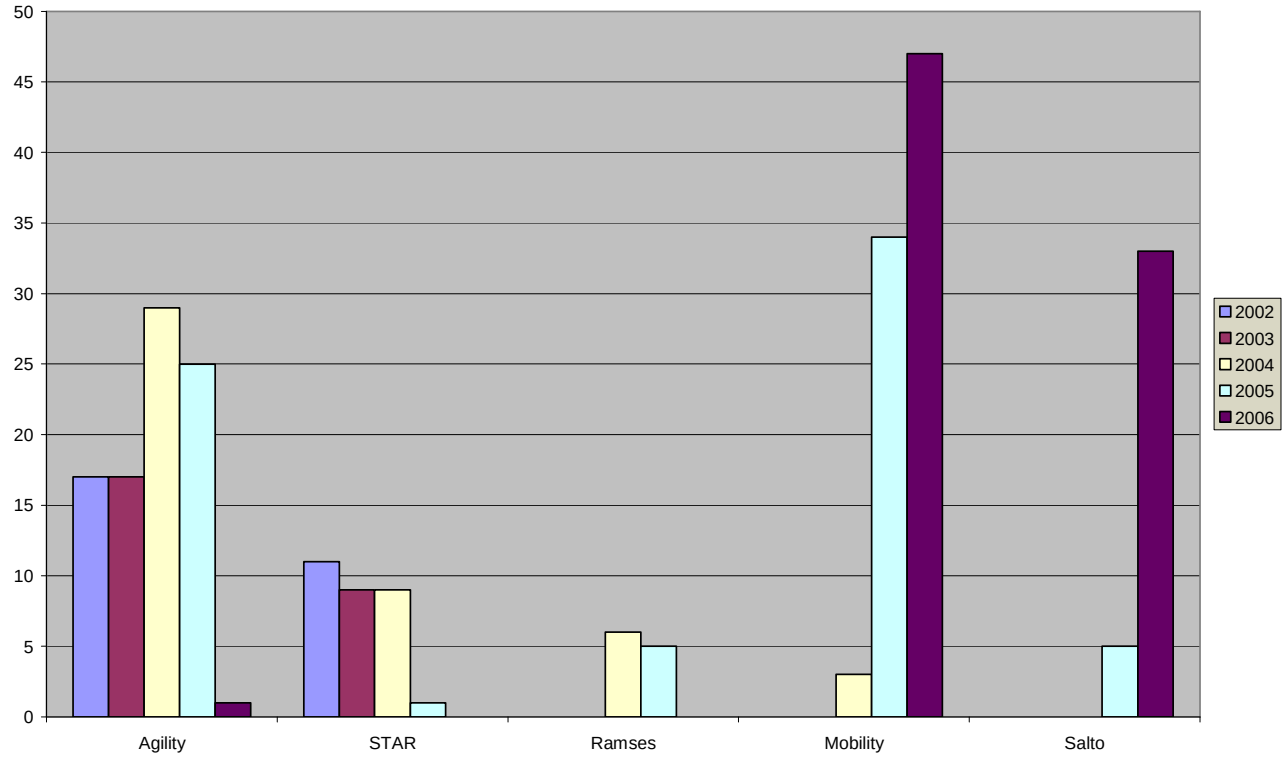
Surgeon grade
The updated forms introduced in 2005 have separated advanced trainee into supervised and unsupervised.

Consultant	150
Advanced trainee supervised	1

Prosthesis usage
Ankle prostheses used in 2006

Mobility	47
Salto	33
Agility	1

MOST USED ANKLE PROSTHESES USAGE 2002 – 2006



The Agility prosthesis would appear to be in terminal decline

Surgeon and hospital workload

Surgeons
In 2006, 9 surgeons performed 81 primary ankle procedures, an average of 9 procedures per surgeon. 2 surgeons performed more than 20 procedures.

The number of surgeons remained the same as for 2005 but the average procedures per surgeon increased by 1.

Hospitals
In 2006 primary ankle replacement was performed in 14 hospitals. 8 were public and 6 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 seven year period January 2000– December 2006, there were 19 revision ankle procedures registered.

The average age for a female with a revision ankle replacement was 59.52 and a male was 66.72 years.

	Female	Male
Number	5	14
Percentage	26.32	73.68
Mean	59.52	66.72
Maximum age	78.98	76.56
Minimum age	42.15	53.02
Standard dev.	15.13	6.83

REVISION OF REGISTERED PRIMARY ANKLE ARTHROPLASTY

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

There were 9 revisions of the primary group of 298 (3.0%) and 1 re-revision giving 10 revisions in total.

Time to revision

Mean	809 days
Maximum	1966 days
Minimum	32 days
Standard deviation	609 days

Statistical Note

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

Observed Component Years

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

Rate/100 Component Years –

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

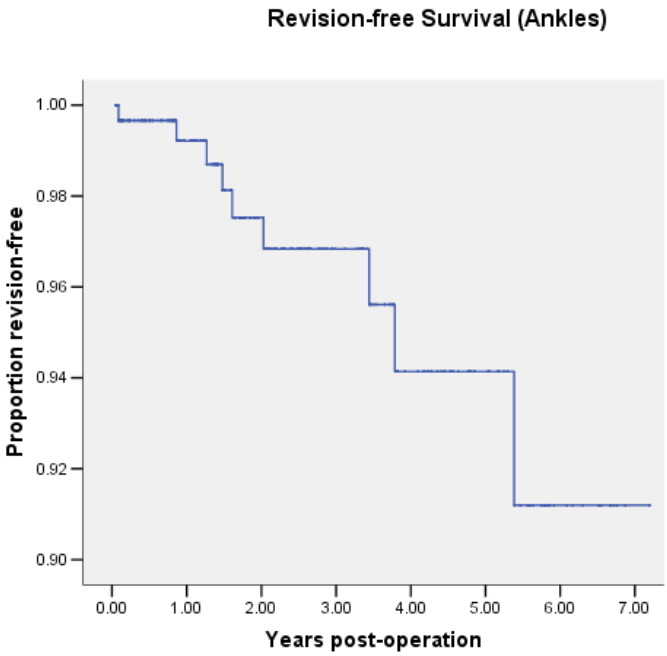
Revision of Ankle Prostheses

Ankles	Total number	Number revised	Observed component years	Rate/100 component years	Exact 95% confidence interval
Agility	119	4	411	1.0	0.27, 2.49
Mobility	84	1	74	1.4	0.03, 7.58
Ramses	11	1	21	4.7	0.12, 25.98
Salto	38	0	23	0.0	
STAR	46	3	171	1.8	0.36, 5.12
Total	**298**	**9**	**700**	**1.3**	**0.59, 2.44**

The Agility is the current benchmark in New Zealand despite it being no longer implanted.

KAPLAN MEIER CURVE

The following Kaplan Meier survival analysis is for years 2000 – 2006 with deceased patients censored at time of death.



Numbers are too few to give accurate year by year revision free percentages

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS POST SURGERY

At six months post surgery patients are sent a questionnaire. This is modeled on the Oxford 12, but is not validated.

There are 12 questions, scoring from 1 to 5. A score of 12 is the best, indicating normal function. A score of 60 is the worst, indicating the most severe disability.
This year we have grouped the questionnaire responses into six categories;

Category 1	12 – 17	(excellent)
Category 2	18 – 23	(very good)
Category 3	24 – 29	(good)
Category 4	30 – 35	(fair)
Category 5	36 – 41	(poor)
Category 6	>41	(very poor)

For the seven year period and as at July 2007, there were 238 primary ankle questionnaire responses registered at six months post surgery.
The mean primary ankle score was 27.16 (standard deviation 10.25, range 12 – 58)

Scoring	12 – 17	46
Scoring	18 – 23	57
Scoring	24 – 29	49
Scoring	30 – 35	32
Scoring	36 – 41	30
Scoring	> 41	24

At six months post surgery, 42% had an excellent or very good score.

Analysis of the individual questions

Analysis of the individual questions showed that there were problems with pain (Q1), walking on uneven ground (Q3), having to use an orthotic (Q4), pain with work (Q5), limping (Q6), pain with recreational activities (Q9) and swelling of the foot (Q10).

Percentage scoring 4 or 5 for each question (n = 238)

1	Moderate or severe pain from the operated ankle	25.6
2	Only able to walk around the house or unable to walk before the pain becomes severe	8.4
3	Extreme difficulty or impossible to walk on uneven ground	16.4
4	Most of the time or always have to use an orthotic	24
5	Pain greatly or totally interferes with usual work	21.4
6	Limping most or every day	33.2
7	Extreme difficulty or impossible to climb a flight of stairs	8.4
8	Pain from your ankle in bed most or every nights	5.5
9	Pain from your ankle greatly or totally interferes with usual recreational activities	26.5
10	Have swelling of your foot most or all of the time	34.9
11	Very painful or unbearable to stand up from a chair after a meal	5.9
12	Sudden severe pain from your ankle most or every day	6.3

Complication data from the questionnaires

Each questionnaire has a section to report hospitalisation for dislocation, infection, DVT, pulmonary embolism or any other reason.
Analysis of the 238 questionnaires gave the following numbers of self reported dislocation and infection for the seven year period.

	Number	Registered revision
Infection	7	2 (1 A/K amputation)
Dislocation	4	1 (ankle fusion)

Revision ankle questionnaire responses

There were 11 revision ankle responses with only 4 achieving an excellent or very good score. This group includes all revision ankle responses. The mean revision ankle score was 31.45 (standard deviation 14.37, range 12 – 51). There was no complication data reported.

Relationship of Oxford Score to Early Revision

There are insufficient numbers to perform an analysis as for hip and knee arthroplasty.

SHOULDER ARTHROPLASTY

PRIMARY SHOULDER ARTHROPLASTY

The **seven** year report analyses data for the period January 2000 – December 2006. There were 1641 primary shoulder procedures registered, an additional 366 compared to last year's report.

2000	122
2001	162
2002	193
2003	225
2004	280
2005	293
2006	366

There was a 25% increase in the number of shoulder arthroplasties performed during 2006 which compared with a 5% increase in the previous year.

DATA ANALYSIS

Age and Sex Distribution

Of the 1641 shoulder registrations, 761 (46%) were hemiarthroplasties. The remaining 880 (54%) were total shoulder arthroplasties, including 137 reverse shoulders and 20 resurfacing shoulders.
The average age for a shoulder replacement was 70.06 years, with a range of 15.63 – 97.71 years.

	Female	Male
Number	1092	549
Percentage	66.54	33.46
Mean age	71.59	67.04
Maximum age	97.71	90.48
Minimum age	15.63	21.83
Standard dev.	10.27	10.90

Previous operation

None	1382
Rotator cuff repair	48
Internal fixation for juxtarticular fracture	44
Previous stabilisation	37
Acromioplasty	31
Arthroscopy/debridement	20
Subacromial decompression	5
Other	9

Diagnosis

Osteoarthritis	864
Rheumatoid arthritis	201
Acute fracture prox. Humerus	194
Post old trauma	137
Cuff arthropathy	161
Avascular necrosis	63
Other inflammatory	24
Post recurrent dislocation	14
Tumour	9
Post dysplasia	1
Other	7

Approach

Deltopectoral	1503
Deltoid split	16
Anterior	15
Posterior	3
McKenzie	2

Bone graft

Humeral autograft	46
Humeral allograft	8
Humeral synthetic	2
Glenoid autograft	11
Glenoid allograft	1

Cement

Humerus cemented	768
Antibiotic in cement	416
Glenoid cemented	512
Antibiotic in cement	300

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 1528 (93%)

Operating theatre

Conventional	1206
Laminar flow	412
Space suits	130

ASA Class

This was introduced with the updated forms at the beginning of 2005. There are 494/659 (75%) 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

Analysis of ASA

ASA	No.	%	Mean age
1	48	9.72	64.58
2	265	53.64	69.03
3	178	36.03	72.07
4	3	0.61	76.33

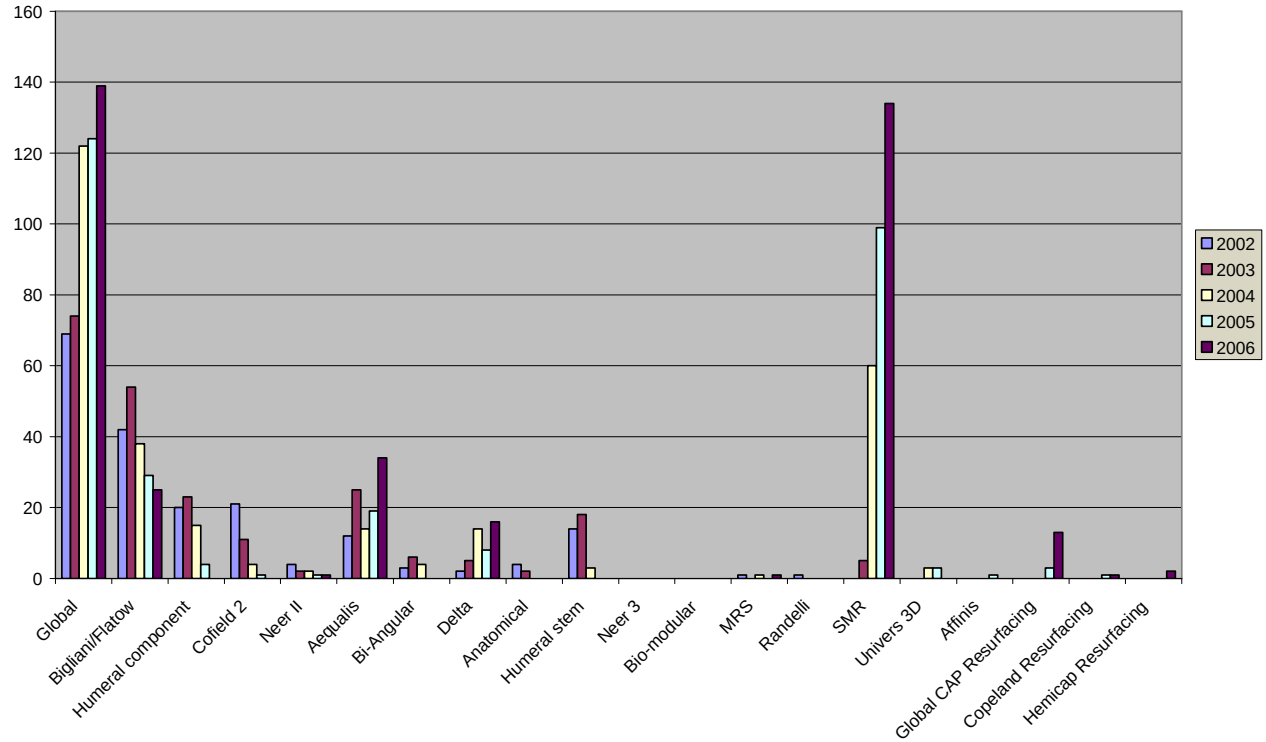
Operative time (skin to skin) for hemiarthroplasty

Mean	105	minutes
Standard deviation	35	minutes
Minimum	30	minutes
Maximum	360	minutes

Operative time (skin to skin) for total shoulder arthroplasty

Mean	132	minutes
Standard deviation	34	minutes
Minimum	49	minutes
Maximum	270	minutes

MOST USED SHOULDER PROSTHESES 2002 – 2006



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

Consultant	630
Advanced trainee supervised	25
Basic trainee	1

Prosthesis usage
Shoulder prostheses used in 2006

Global	139
SMR	134
Aequalis	34
Bigliani/Flatow	25
Delta	16
Global CAP Resurfacing	13
Hemicap Resurfacing	2
Copeland Resurfacing	1
MRS Humeral	1
Neer II	1

The Global prosthesis was strongly challenged by the SMR during 2006.

Surgeon and hospital workload

Surgeons
In 2006, 63 surgeons performed 366 shoulder procedures, an average of 6 procedures per surgeon. 1 surgeon performed more than 30 procedures.

The number of surgeons has stayed the same after the big increase of 2005. The average per surgeon has increased by 1.

Hospitals
In 2006, shoulder replacement was performed in 43 hospitals. 24 were public and 19 were private.
For 2006 the average number of shoulder replacements per hospital was 9.

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

Data analysis
For the seven year period January 2000 – December 2006, there were 105 revision shoulder procedures registered. This is an additional 25 compared to last year's report. The average age for a female with a revision shoulder was 68.80 and a male was 66.27 years. (range 33.89 to 87.22)

	Female	Male
Number	58	47
Percentage	55.24	44.76
Mean	68.80	66.27
Maximum age	87.22	81.83
Minimum age	33.89	40.78
Standard dev.	12.07	10.72

REVISION OF REGISTERED PRIMARY SHOULDER ARTHROPLASTY
This section analyses data for revisions of registered primary shoulder procedures for the seven year period.

There were 43 revisions of the primary group of 1661 (2.59%) and 4 re-revisions, giving 47 revisions in total.

Time to revision

Mean	507	days
Maximum	1788	days
Minimum	0	days
Standard deviation	501	days

Reason for revision

Pain	17
Dislocation/instability anterior	9
Deep infection	4
Loosening glenoid	2
Instability posterior	2
Subacromial cuff impingement	1
Fracture humerus	1
Other	7

Analysis by time for the 2 main reasons for revision

Pain n = 17

< 6 months	1
6 months – 1 year	5
>1 – 2 years	4
>2 – 3 years	3
> 3 – 4 years	**1**
>4 – 5 years	3

Dislocation n = 9

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

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

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

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

Shoulders	Total number	Number revised	Observed component years	Rate/100 component years	Exact 95% confidence interval
Aequalis	131	3	379	0.8	0.16, 2.31
Bi-Angular	27	2	122	1.6	0.2, 5.94
Bigliani/Flatow	233	6	760	0.8	0.29, 1.72
Cofield 2	71	0	324	0.0	
Delta	49	0	102	0.0	
Global	614	19	1504	1.3	0.76, 1.97
Humeral component	91	1	355	0.3	0.01, 1.57
Humeral stem	41	0	165	0.0	
Neer II	36	0	170	0.0	
SMR	298	12	351	3.4	1.77, 5.97
Total	**1591**	**43**	**4233**	**0.99**	**0.72, 1.34**

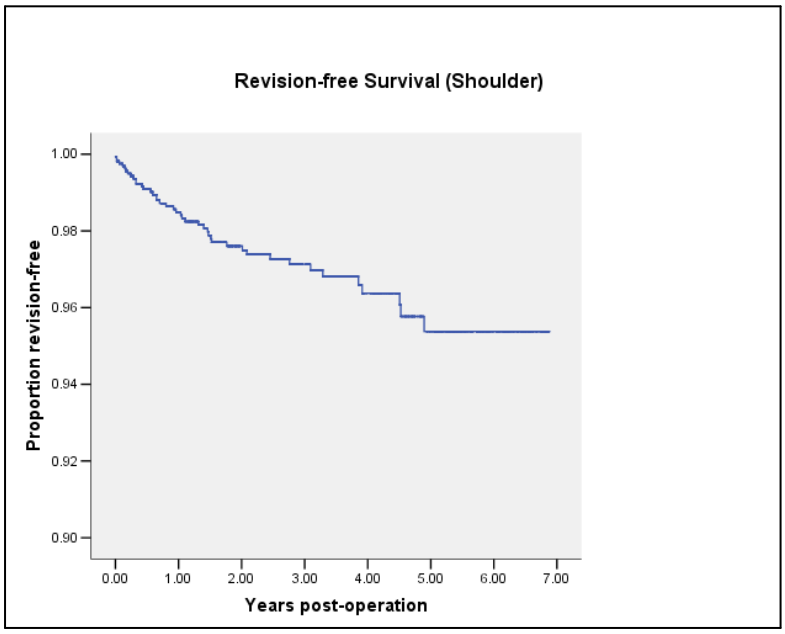
The SMR is the standout but for the number implanted the OCYS are small and the confidence intervals wide.

Shoulder arthroplasty	Total number	Number revised	Observed component years	Rate/100 component years	Exact 95% confidence interval
Total	860	19	2017	0.9	0.57, 1.47
Hemi	761	24	2319	1.0	0.66, 1.54

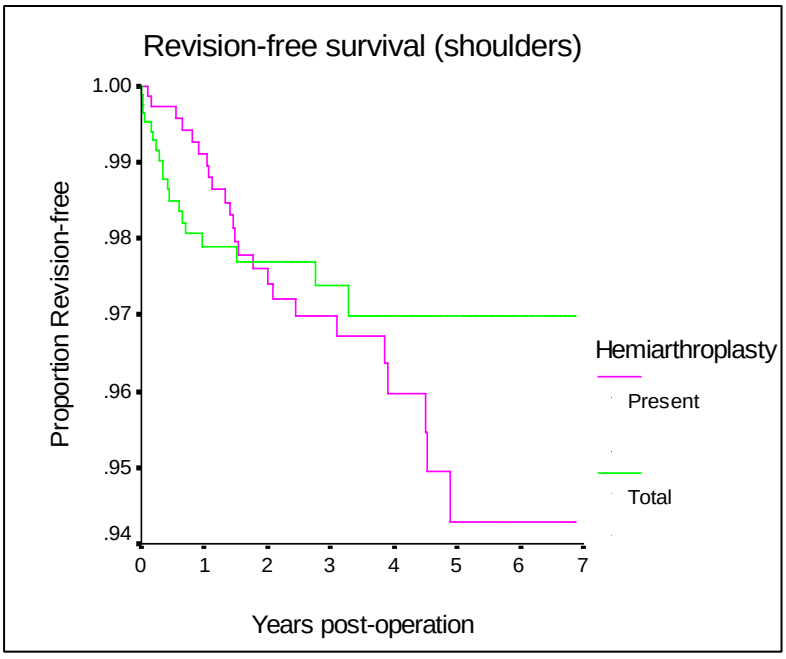
There is no significant difference in revision rates for total and hemiarthroplasties (p=0.58)

KAPLAN MEIER CURVES

The following two Kaplan Meier survival analyses are for years 2000 – 2006 with deceased patients censored at time of death



Revision free survival at one year is 98.5%; two years 97.6%; 3 years 97.1%; 4 years 96.4%. There are insufficient numbers for percentage survival beyond 4 years.



Revision free survival percentages **total** versus **hemiarthroplasty**

	Total	Hemi
1 year	97.9	99.1
2 year	97.7	97.6
3 year	97.4	97.0
4 year	97.0	96.0
5 year	97.0	94.3

The apparent rapid decline for hemiarthroplasty after 4 years has to be interpreted with caution due to the small numbers in both groups.

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS POST SURGERY

At six months post surgery patients are sent the Oxford 12 questionnaire. There are 12 questions, scoring from 1 to 5. A score of 12 is the best, indicating normal function. A score of 60 is the worst, indicating the most severe disability. This year we have grouped the questionnaire responses into six categories;

For the seven year period and as at July 2006, there were 1144 shoulder questionnaire responses registered at six month post surgery.
The mean shoulder score was 24.50 (standard deviation 9.9, range 12 – 56)

Category 1	12 – 17	(excellent)
Category 2	18 – 23	(very good)
Category 3	24 – 29	(good)
Category 4	30 –35	(fair)
Category 5	36 – 41	(poor)
Category 6	>41	(very poor)

Scoring	12 – 17	339
Scoring	18 – 23	285
Scoring	24 – 29	205
Scoring	30 – 35	143
Scoring	36 – 41	91
Scoring	> 41	81

At six month post surgery, 55% had an excellent or very good score.

Analysis of the individual questions

Analysis of the individual questions showed that there were problems with pain (Q1 and Q2), brushing hair (Q7) and hanging clothes in a wardrobe (Q9).

Percentage scoring 4 or 5 for each question (n = 1144)

1	The worst pain from the shoulder is severe or unbearable	18.0%
2	Usually have moderate or severe pain from the operated shoulder	23.3%
3	Extreme difficulty or impossible to get in and out of a car or public transport	3.6%
4	Extreme difficulty or impossible to use a knife and fork at the same time	4.3%
5	Extreme difficulty or impossible to do the household shopping on your own	8.0%
6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	8.3%
7	Extreme difficulty or impossible to brush or comb hair with the operated arm	19.0%
8	Extreme difficulty or impossible to dress yourself because of your operated shoulder	8.1%
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	17.0%
10	Extreme difficulty or impossible to wash and dry under both arms	10.1%
11	Pain from operated shoulder greatly or totally interfering with usual work	13.7%
12	Pain from shoulder in bed most or every nights	15.4%

Relationship to Oxford Score to early revision

The above has not been evaluated to the same extend as for primary hip and knee arthroplasty as the numbers are too small for statistical significance. However a Receiver Operating Characteristic (ROC) analysis demonstrated that 76% of the revisions within 2 years occurred in patients with Oxford Score >26.

Complication data from the questionnaires

Each questionnaire has a section to report hospitalisation for dislocation, infection, DVT, pulmonary embolism or any other reason.
Analysis of the 1144 questionnaires gave the following numbers of self reported dislocation and infection for the six year period.

	Number	Registered revision
Dislocation	12	8
Infection	12	2
Manipulation	2	

Revision shoulder questionnaire responses

There were 72 revision shoulder responses with only 26% achieving an excellent or very good score. This group includes all revision shoulder responses. The mean revision shoulder score was 32.43 (standard deviation 11.18, range 13 – 57).

ELBOW ARTHROPLASTY

PRIMARY ELBOW ARTHROPLASTY

The **seven** year report analyses data for the period January 2000 – December 2006. There were 191 primary elbow procedures registered, an additional 31 compared to last year's report.

2000	18
2001	29
2002	32
2003	23
2004	28
2005	30
2006	31

DATA ANALYSIS

Age and Sex Distribution

The average for a primary elbow replacement was 66.15 years with a range of 36.38 - 87.87. The average age for a female with a primary elbow replacement is 66.01 years and for a male is 66.65 years with a range from 36.38 to 87.87.

	Female	Male
Number	149	42
Percentage	78.01	21.99
Mean age	66.01	66.65
Maximum age	86.68	87.87
Minimum age	36.38	41.62
Standard dev.	11.38	11.41

Previous operation

None	159
Internal fixation for juxtarticular fracture	8
Synovectomy	6
Nerve transposition	3
Ligament reconstruction	1
Interposition arthroplasty	1
Debridement	1
Osteotomy	1
Other	3

Diagnosis

Rheumatoid arthritis	114
Post fracture	45
Osteoarthritis	20
Other inflammatory	4
Tumour	4
Post dislocation	3
Post ligament disruption	1
Other	4

Approach

Posterior	120
Medial	38
Lateral	16

Bone graft

Humeral autograft	19
Humeral allograft	2
Ulnar autograft	2

Cement

Humerus cemented	170
Antibiotic in cement	97
Ulna cemented	171
Antibiotic in cement	92
Radius cemented	5
Antibiotic in cement	5

Systemic antibiotic prophylaxis

Patient number receiving at least one systemic antibiotic 178 (93%)

Operating theatre

Conventional	161
Laminar flow	30
Space suits	10

ASA Class

This was introduced with the updated forms at the beginning of 2005. There are 42/61 (69%) 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	No.	%	Mean age
1	2	4.8	56.50
2	19	45.2	63.68
3	19	45.2	70.79
4	2	4.8	62.50

The much higher proportion of ASA 3 patients is due to the predominance of Rheumatoid patients.

Operative time (skin to skin)

Mean	132 minutes
Standard deviation	31 minutes
Minimum	56 minutes
Maximum	231 minutes

Surgeon grade

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

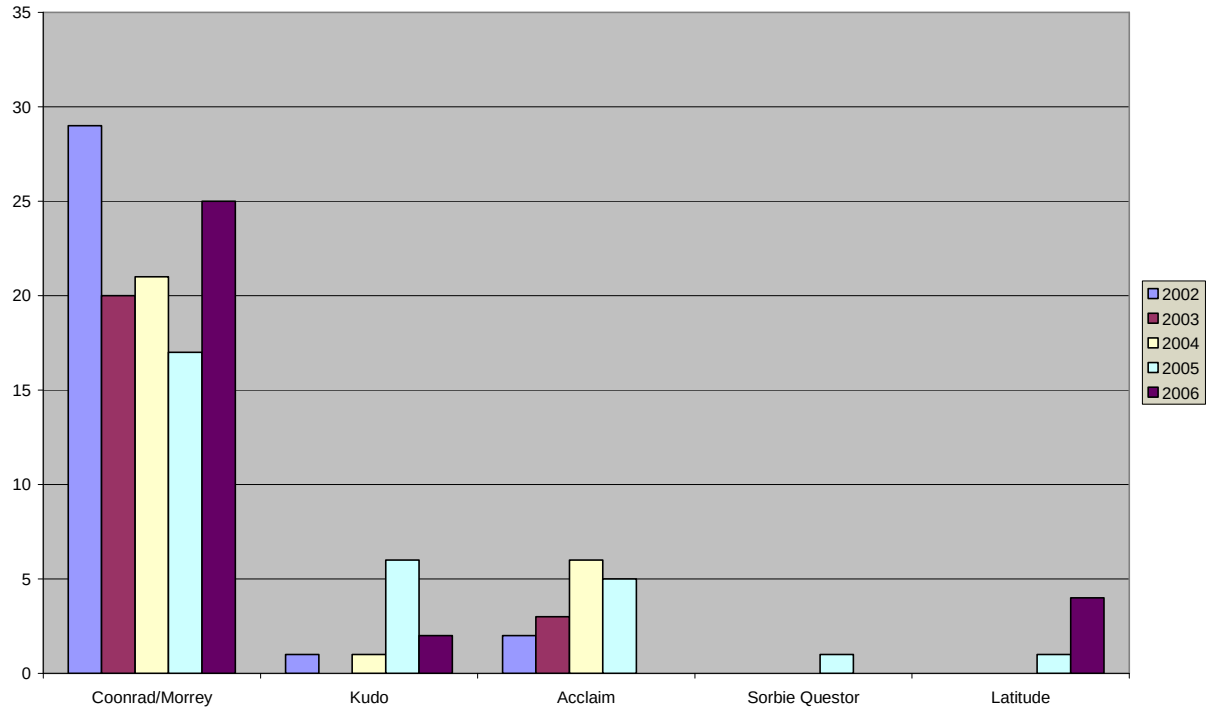
Consultant	61

Prosthesis usage

Elbow prostheses used in 2006

Coonrad/Morrey	25
Latitude	4
Kudo	2

MOST USED ELBOW PROSTHESES 2002 – 2006



Surgeon and hospital workload
In 2006, 18 surgeons performed 31 primary elbow procedures, an average of less than 2 procedures per surgeon.

Hospitals
In 2006, primary elbow replacement was performed in 17 hospitals. 11 were public and 6 were private. For 2006 the average number of primary elbow replacements per hospital was 3.

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 seven year period January 2000 – December 2006, there were 31 revision elbow procedures registered. This is an additional 5 compared to last year's report.
The average age for a female with a revision elbow replacement was 63.50 and a male was 66.62 with a range from 42.23 to 88.95.

	Female	Male
Number	23	8
Percentage	74.19	25.81
Mean	63.50	66.62
Maximim age	88.95	80.37
Minimum age	42.23	50.73
Standard dev.	11.03	9.76

REVISION OF REGISTERED PRIMARY ELBOW ARTHROPLASTY
This section analyses data for revisions of primary elbow procedures for the seven year period.

There were 8 revisions of the primary group of 191 (4.19%).

Time to revision

Mean	557	days
Maximum	868	days
Minimum	62	days
Standard deviation	307	days

Reason for revision
Loosening ulnar component n = 2

>2 – 3 years	2

Deep infection n = 2

>1 – 2 years	1
>2 – 3 years	1

Pain n = 2

>6 months – 1 year	1
>1 – 2 years	1

Fracture humerus n = 1

>6 months – 1 year	1

Dislocation n = 1

< 6 months	1

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

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

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

REVISION OF ELBOW PROSTHESIS

Elbows	Total number	Number revised	Observed component years	Rate/100 component years	Exact 95% confidence interval
Acclaim	16	2	37	5.4	0.66, 19.56
Coonrad/Morrey	151	4	468	0.9	0.23, 2.19
Custom device	1	0	6	0.0	
Kudo	17	2	52	3.9	0.47, 13.91
Latitude	5	0	3	0.0	
Sorbie Questor	1	0	1	0.0	
Total	**191**	**8**	**567**	**1.4**	**0.61, 2.78**

PATIENT BASED QUESTIONNAIRE OUTCOMES AT SIX MONTHS POST SURGERY

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

There are 12 questions, scoring from 1 to 5. A score of 12 is the best, indicating normal function. A score of 60 is the worst, indicating the most severe disability.
This year we have grouped the questionnaire responses into six categories;

Category 1	12 – 17	(excellent)
Category 2	18 – 23	(very good)
Category 3	24 – 29	(good)
Category 4	30 – 35	(fair)
Category 5	36 – 41	(poor)
Category 6	>41	(very poor)

For the seven year period and as at July 2007, there were 143 primary elbow responses registered at six months post surgery.
The mean primary elbow score was 22.41 (standard deviation 9.91, range 12 – 52)

Scoring	12 – 17	63
Scoring	18 – 23	28
Scoring	24 – 29	18
Scoring	30 – 35	16
Scoring	36 – 41	7
Scoring	> 41	11

At six months post surgery, 64% had an excellent or very good score.

Analysis of the individual questions

Analysis of the individual questions showed that there were problems with carrying the household shopping (Q5), pain with work or recreational activities (Q11) and carrying a tray of food (Q6).

Percentage scoring 4 or 5 for each question (n = 143)

1	The worst pain from the shoulder is severe or unbearable	9.8%
2	Extreme difficulty or impossible to dress yourself because of your operated elbow	6.3%
3	Extreme difficulty or impossible to lift a teacup safely with your operated arm	5.6%
4	Extreme difficulty or impossible to get your hand to your mouth	4.2%
5	Extreme difficulty or impossible to carry the household shopping with your operated arm	16.1%

6	Extreme difficulty or impossible to carry a tray containing a plate of food across a room	14.0%
7	Extreme difficulty or impossible to brush or comb hair with the affected arm	11.9%
8	Usually have moderate or severe pain from the operated elbow	11.2%
9	Extreme difficulty or impossible to hang clothes in a wardrobe using operated arm	9.8%
10	Extreme difficulty or impossible to wash and dry under both arms	12.6%
11	Pain from operated elbow greatly or totally interfering with usual work or hobbies	13.3%
12	Pain from elbow in bed most or every nights	8.4%

Complication data from the questionnaires
Each questionnaire has a section to report hospitalisation for dislocation, infection, DVT, pulmonary embolism or any other reason. Analysis of the 143 questionnaires gave the following numbers of self reported dislocation and infection for the seven year period.

	Number	Registered revision
Dislocation	1	0
Infection	1	0

Revision elbow questionnaire responses
There were 19 revision elbow responses with 37% achieving an excellent or very good score. This group includes all revision elbow responses. The mean revision elbow score was 26.11 (standard deviation 9.01, range 12 – 40).

Relationship of Oxford Score to Early Revision
There are insufficient numbers to perform an analysis as for hip and knee arthroplasty.

Appendix I

PROSTHESIS INVENTORY

HIPS		
	Femoral Components	**Acetabular Components**
De Puy	Elite Plus	Charnley
	Summit	Duraloc
	Charnley	Pinnacle
	Corail	
	ASR	
Stryker	Accolade	Trident
	Exeter	Exeter
		Contemporary
Zimmer	CCA	CCB
	CLS	CLS
	CPT	Fitek
	MS30	Fitmore
	Versys	Morscher
	Muller	ZCA
	Duron	Osteolock
		Trilogy
Smith & Nephew	Spectron	Reflection
	Synergy Porous	
	BHR	
Mathy's	Twinsys	RM
		Weber

KNEES		
Biomet	AGC	
	Maxim	
De Puy	LCS	
	PFC Sigmar	
	LCS PFJ	
Global Orthopaedics	MBK	
Smith & Nephew	Genesis	
	Mod 3	
Stryker	Duracon	
	Scorpio	
	Triathlon	
	Avon Patello	
Zimmer	Insall Burstein	
	Nexgen	
Orthotec	Optetrak	
	Themis	
Advanced Surgical Technologies	Advance	

UNI COMPARTMENTAL KNEES		
Biomet	Oxford	
	Repicci II	
Zimmer	Miller/Galante	
	Zimmer Uni	
De Puy	Preservation	
	LCS	
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	MRS Humeral	

ANKLES		
DePuy	Agility	
	Mobility	
Orthotec	Ramses	
REM Systems	Salto	
Link	Star	

ELBOWS		
Zimmer	Coonrad/Morrey	
DePuy	Acclaim	
Biomet	Kudo	
REM Systems	Latitude	

APPENDIX II

Reference

The Oxford Hip Scores for Primary and Revision Hip Replacement. Field RE, Cronin MD, Singh PJ, J Bone and Joint Surg 2004 87B - 5, 618-622

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

NATIONAL JOINT REGISTER
Primary Replacement Hip

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

PREVIOUS OPERATION ON INDEX JOINT

- ❑ None
- ❑ Internal fixation for juxtarticular fracture ❑
- ❑ Osteotomy
- ❑ Arthrodesis

Other: .....
……..

DIAGNOSIS

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

APPROACH ❑ Image guided surgery ❑ Minimally invasive surgery

❑ Anterior ❑ Posterior ❑ Lateral ❑ Trochanteric osteotomy

FEMUR

Please do not fold bar-coded label

ACETABULUM

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

BONE GRAFT - ACETABULUM

- ❑ Allograft
- ❑ Autograft
- ❑ Synthetic

FEMORAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

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

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

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

NATIONAL JOINT REGISTER
Primary Replacement Knee
Free Phone 0800-274-989 ❑ Total Knee Arthroplasty ❑ Unicompartmental ❑ Patellofemoral 07.04.2005

Date: .....

Consultant: ……
[If different from patient label]

Patient Name:
Address:

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

Side:..... **

Hospital: .....

Town/City:……

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

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

FEMUR

Please do not fold bar-coded label

TIBIA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - FEMUR

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

BONE GRAFT - TIBIA

- ❑ Allograft
- ❑ Autograft ❑ Synthetic

PATELLA

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

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

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

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

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

PRIMARY OPERATING SURGEON
❑ 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

NATIONAL JOINT REGISTER
Primary Replacement Ankle

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

Date: .....

Patient Name:
Address:

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

Consultant: ……
[If different from patient label]

Side:..... **

Hospital: .....

Town/City ……

Tick Appropriate Boxes

PREVIOUS OPERATION ON INDEX JOINT
- ❑ None
- ❑ Internal fixation for juxtarticular fracture ❑
- ❑ Arthrodesis
- Other: Name: .....
- ❑ Osteotomy

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 Supervised ❑ Adv Trainee Unsupervised Year…… ❑ Basic Trainee

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

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

NATIONAL JOINT REGISTER

Primary Replacement Shoulder

Free Phone 0800-274-989 ❑ **Total shoulder arthroplasty** ❑ **Hemiarthroplasty 07.04.2005**

Date: .....

Consultant: ……

[If different from patient label]

Patient Name:
Address:

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

Attach Patient Label

Side:..... **

Hospital: .....

Town/City……

Tick Appropriate Boxes

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
- ❑ Post dysplasia
- ❑ 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

❑ **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

NATIONAL JOINT REGISTER
Primary Replacement Elbow

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: ……

PREVIOUS OPERATION ON INDEX JOINT

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

DIAGNOSIS

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

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold bar-coded label

ULNA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - ULNA

❑ Allograft
❑ Autograft ❑ Synthetic

RADIAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

❑ 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

NATIONAL JOINT REGISTER
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

NATIONAL JOINT REGISTER
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

❑ 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

NATIONAL JOINT REGISTER
Revision Ankle Joint

Free Phone 0800-274-989 07.04.2005

Date: .....

Patient Name:
Address:

d.o.b. NHI:
Attach Patient Label

Consultant: ……
[If different from patient label]

Side:..... **

Hospital: .....

Town/City: ……..

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ Anterior ❑ Anterio-lateral ❑ Posterior

TIBIA

Please do not fold bar-coded label

TALUS

Please do not fold bar-coded label

STICK ALL LABELS ON REVERSE SIDE

BONE GRAFT - TIBIA

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - TALUS

❑ Allograft
❑ Autograft ❑ Synthetic

AUGUMENTS

Please do not fold bar-coded label

FUSION DISTAL TFJ

Yes ❑ No ❑

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

❑ Talus ❑ Tibia ❑ Antibiotic brand: ……

❑ SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

❑ 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

NATIONAL JOINT REGISTER
Revision Shoulder

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

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

REVISION

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

APPROACH

- ❑ Deltopectoral
- ❑ Other: specify

HUMERUS

Please do not fold bar-coded labels

GLENOID

Please do not fold bar-coded labels

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

- ❑Allograft
- ❑ Synthetic
- ❑Autograft

BONE GRAFT - GLENOID

- ❑Allograft
- ❑ Synthetic
- ❑Autograft

HUMERAL HEAD

Please do not fold bar-coded labels

AUGMENTS

Please do not fold bar-coded labels

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑**SYSTEMIC ANTIBIOTIC PROPHYLAXIS**

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

OPERATING THEATRE

❑Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

❑ Adv Trainee Unsupervised

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

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

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

NATIONAL JOINT REGISTER
Revision Elbow Joint

Free Phone 0800-274-989 07.04.2005

Date: .....

Patient Name:
Address:

d.o.b. NHI:

Attach Patient Label

Consultant: ……
[If different from patient label]

Side:..... **

Hospital: .....

Town/City: ……

Tick Appropriate Boxes

REASON FOR REVISION

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

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

REVISION

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

APPROACH

❑ Medial ❑ Lateral ❑ Posterior

HUMERUS

Please do not fold bar-coded label

ULNA

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

BONE GRAFT - HUMERUS

❑ Allograft
❑ Autograft ❑ Synthetic

BONE GRAFT - ULNA

❑ Allograft
❑ Autograft ❑ Synthetic

RADIAL HEAD

Please do not fold bar-coded label

AUGMENTS

Please do not fold bar-coded label

STICK EXTRA LABELS ON REVERSE SIDE

CEMENT

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

❑ SYSTEMIC ANTIBIOTIC PROPHYLAXIS

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

OPERATING THEATRE

❑Conventional ❑ Laminar flow or similar ❑ Space suits

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

PRIMARY OPERATING SURGEON

❑ Adv Trainee Unsupervised

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

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

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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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 hip?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 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)
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 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?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

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

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

6. Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

7 How much has pain from your operated on hip interfered with your usual work (including housework)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 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?
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

9. Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?
   1 Rarely/never
   2 Sometimes or just at first
   3 Often, not just at first
   4 Most of the time
   5 All of the time

10. Have you been limping when walking, because of your operated on hip?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 Every day

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

12 Have you been troubled by pain from your operated on hip in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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 hip?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 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)
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 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?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

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

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

6. Have you had any trouble with washing and drying yourself (all over) because of your operated on hip?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

7 How much has pain from your operated on hip interfered with your usual work (including housework)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 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?
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

9 Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected operated on hip?
   1 Rarely/never
   2 Sometimes or just at first
   3 Often, not just at first
   4 Most of the time
   5 All of the time

10 Have you been limping when walking, because of your operated on hip?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 Every day

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

12 Have you been troubled by pain from your operated on hip in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 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)
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 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?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Could you kneel down and get up again afterwards on your operated knee?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

6. Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

7 How much has pain from your operated on knee interfered with your usual work (including housework)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 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?
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

9 Have you felt that your operated on knee might suddenly "give way" or let you down?
   1 Rarely/never
   2 Sometimes or just at first
   3 Often, not just at first
   4 Most of the time
   5 All of the time

10 Have you been limping when walking, because of your operated on knee?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 Every day

11 Could you walk down a flight of stairs?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

12 Have you been troubled by pain from your operated on knee in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 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)
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 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?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Could you kneel down and get up again afterwards on your operated knee?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

6. Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

7 How much has pain from your operated on knee interfered with your usual work (including housework)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 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?
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

9 Have you felt that your operated on knee might suddenly "give way" or let you down?
   1 Rarely/never
   2 Sometimes or just at first
   3 Often, not just at first
   4 Most of the time
   5 All of the time

10 Have you been limping when walking, because of your operated on knee?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 Every day

11 Could you walk down a flight of stairs?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

12 Have you been troubled by pain from your operated on knee in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 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)
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 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?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do
4. Could you kneel down and get up again afterwards?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible
5. Could you do the household shopping on your own?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible
6. Have you had any trouble with washing and drying yourself (all over) because of your operated on knee?
   1 No trouble at all
   2 Very little trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do
7. How much has pain from your operated on knee interfered with your usual work (including housework)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 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?
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable
9. Have you felt that your operated on knee might suddenly "give way" or let you down?
   1 Rarely/never
   2 Sometimes or just at first
   3 Often, not just at first
   4 Most of the time
   5 All of the time
10. Have you been limping when walking, because of your operated on knee?
    1 No days
    2 Only 1 or 2 days
    3 Some days
    4 Most days
    5 Every day
11. Could you walk down a flight of stairs?
    1 Yes, easily
    2 With little difficulty
    3 With moderate difficulty
    4 With extreme difficulty
    5 No, impossible
12. Have you been troubled by pain from your operated on knee in bed at night?
    1 No nights
    2 Only 1 or 2 nights
    3 Some nights
    4 Most nights
    5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

2. For how long have you been able to walk before the pain from your operated on ankle becomes severe?
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 Unable to walk at all because of severe pain.

3. Have you been able to walk on uneven ground?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 Extreme difficulty
   5 No impossible.

4. Have you had to use an orthotic (shoe insert), heel lift, or special shoes.
   1 Never
   2 Occasionally
   3 Often
   4 Most of the time
   5 Always

5. How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

6. Have you been limping when walking because of your operated on ankle?
   1 No days
   2 Only one or two days
   3 Some days
   4 Most days
   5 Every day

7 Have you been able to climb a flight of stairs.
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 Impossible

8. Have you been troubled by pain from your operated on ankle in bed at night?
   1 No nights
   2 Only one or two nights
   3 Some nights
   4 Most nights
   5 Every night

9. How much has pain from your operated on ankle interfered with your usual recreational activities?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

10 Have you had swelling of your foot
   1 None at all
   2 Occasionally
   3 Often
   4 Most of the time
   5 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.
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

12 Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

2. For how long have you been able to walk before the pain from your operated on ankle becomes severe?
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 Unable to walk at all because of severe pain.

3. Have you been able to walk on uneven ground?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 Extreme difficulty
   5 No impossible.

4. Have you had to use an orthotic (shoe insert), heel lift, or special shoes.
   1 Never
   2 Occasionally
   3 Often
   4 Most of the time
   5 Always

5. How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

6. Have you been limping when walking because of your operated on ankle?
   1 No days
   2 Only one or two days
   3 Some days
   4 Most days
   5 Every day

7 Have you been able to climb a flight of stairs.
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 Impossible

8. Have you been troubled by pain from your operated on ankle in bed at night?
   1 No nights
   2 Only one or two nights
   3 Some nights
   4 Most nights
   5 Every night

9. How much has pain from your operated on ankle interfered with your usual recreational activities?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

12 Have you had swelling of your foot
   1 None at all
   2 Occasionally
   3 Often
   4 Most of the time
   5 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.
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

12 Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Mild
   3 Moderate
   4 Severe
   5 Unbearable

2. How would you describe the pain you ***usually*** have from your operated on shoulder?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

3. Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Have you been able to use a knife and fork at the same time?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

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

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

8. Have you had any trouble dressing yourself because of your operated on shoulder?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

9. Could you hang your clothes up in a wardrobe – using the operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

15 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?.
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

12 Have you been troubled by pain from your operated on shoulder in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

2. For how long have you been able to walk before the pain from your operated on ankle becomes severe?
   1. No pain up to 30 minutes
   2 16 to 30 minutes
   3 5 to 15 minutes
   4 Around the house only
   5 Unable to walk at all because of severe pain.

3. Have you been able to walk on uneven ground?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 Extreme difficulty
   5 No impossible.

4. Have you had to use an orthotic (shoe insert), heel lift, or special shoes.
   1 Never
   2 Occasionally
   3 Often
   4 Most of the time
   5 Always

5. How much has pain from your ankle interfered with your usual work (including housework and hobbies)?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

6. Have you been limping when walking because of your operated on ankle?
   1 No days
   2 Only one or two days
   3 Some days
   4 Most days
   5 Every day

7 Have you been able to climb a flight of stairs.
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 Impossible

8. Have you been troubled by pain from your operated on ankle in bed at night?
   1 No nights
   2 Only one or two nights
   3 Some nights
   4 Most nights
   5 Every night

9. How much has pain from your operated on ankle interfered with your usual recreational activities?
   1 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

16 Have you had swelling of your foot
   1 None at all
   2 Occasionally
   3 Often
   4 Most of the time
   5 All the time

17 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.
   1 Not at all painful
   2 Slightly painful
   3 Moderately painful
   4 Very painful
   5 Unbearable

12 Have you had any sudden severe pain – shooting, stabbing or spasms from your operated on ankle?
   1 No days
   2 Only 1 or 2 days
   3 Some days
   4 Most days
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Mild
   3 Moderate
   6 Severe
   7 Unbearable

2. How would you describe the pain you ***usually*** have from your operated on shoulder?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

3. Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Have you been able to use a knife and fork at the same time?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

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

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

8. Have you had any trouble dressing yourself because of your operated on shoulder?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

9. Could you hang your clothes up in a wardrobe – using the operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

19 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?.
   2 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

12 Have you been troubled by pain from your operated on shoulder in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Mild
   3 Moderate
   8 Severe
   9 Unbearable

2. How would you describe the pain you ***usually*** have from your operated on shoulder?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

3. Have you had any trouble getting in and out of a car or using public transport because of your operated on shoulder?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Have you been able to use a knife and fork at the same time?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

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

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

8. Have you had any trouble dressing yourself because of your operated on shoulder?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

9. Could you hang your clothes up in a wardrobe – using the operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

21 How much has pain from your operated on shoulder interfered with your usual work hobbies or recreational activities (including housework)?.
   3 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

12 Have you been troubled by pain from your operated on shoulder in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Mild
   3 Moderate
   10 Severe
   11 Unbearable

2. Have you had any trouble dressing yourself because of your operated on elbow?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

3. Can you lift a teacup safely with your operated on arm?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Have you been able to get your hand to your mouth?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

5. Could you carry the household shopping with your operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

7 Could you brush/comb your hair with the affected arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, Impossible

8. How would you describe the pain you ***usually*** have from your operated on elbow?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

9. Could you hang your clothes up in a wardrobe – using the operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

23 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
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

12 Have you been troubled by pain from your operated on elbow in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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 1 to 5, from least to most difficulty or severity: 1 being the least difficult/severe and 5 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?
   1 None
   2 Mild
   3 Moderate
   12 Severe
   13 Unbearable

2. Have you had any trouble dressing yourself because of your operated on elbow?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

3. Can you lift a teacup safely with your operated on arm?
   1. No trouble at all
   2 A little bit of trouble
   3 Moderate trouble
   4 Extreme difficulty
   5 Impossible to do

4. Have you been able to get your hand to your mouth?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

5. Could you carry the household shopping with your operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

7 Could you brush/comb your hair with the affected arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, Impossible

8. How would you describe the pain you ***usually*** have from your operated on elbow?
   1 None
   2 Very mild
   3 Mild
   4 Moderate
   5 Severe

9. Could you hang your clothes up in a wardrobe – using the operated on arm?
   1 Yes, easily
   2 With little difficulty
   3 With moderate difficulty
   4 With extreme difficulty
   5 No, impossible

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

25 How much has pain from your operated on elbow interfered with your usual work hobbies or recreational activities (including hobbies and housework)?.
   5 Not at all
   2 A little bit
   3 Moderately
   4 Greatly
   5 Totally

12 Have you been troubled by pain from your operated on elbow in bed at night?
   1 No nights
   2 Only 1 or 2 nights
   3 Some nights
   4 Most nights
   5 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.