AUSTRALIAN ORTHOPAEDIC ASSOCIATION

NATIONAL JOINT REPLACEMENT REGISTRY

Annual Report

2006

AUSTRALIAN ORTHOPAEDIC ASSOCIATION NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT

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NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT
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PARTICIPATING HOSPITALS & COORDINATORS – August 2006

SOUTH AUSTRALIA

Public Hospitals

Clare District Hospital
Jo Knappstien, A/CN Theatre
Flinders Medical Centre
Jo Drabsch, CN Theatre
Lyell McEwin Hospital
Julie Tyreman, RN Theatre
Modbury Public Hospital
Jan Caufield, CN Orthopaedic Theatre
Mt Barker District Soldiers Memorial Hospital
Emma Crowder, RN Theatre
Mt Gambier Regional Hospital
Kay Main, RN Theatre
Murray Bridge Soldiers Memorial Hospital
Chris Jarvis, CN Theatre
Naracoorte Health Service
Margie Sinclair, CN Theatre
Noarlunga Hospital
Carole Dawson, RN Theatre
Port Augusta Hospital
Minnie Reynolds, NUM Theatre
Port Lincoln Hospital
Chris Weber, NUM Theatre
Port Pirie Hospital
Frances Reynolds, Clinical NUM Theatre
Queen Elizabeth Hospital
Carol Saniotis, NUM Theatre
Repatriation General Hospital
Marie Irvine, CN Theatre
Riverland Regional Hospital
Leanne Zerna, RN Theatre
Royal Adelaide Hospital
Lisa Carter, CN Orthopaedic Theatre
Susan Pannach, Outcomes Coordinator
South Coast District Hospital
Judy Anderson, CN Theatre
Whyalla Health Service
Carol McSorley, CN Theatre
Women's and Children's Hospital
Connie Fung, CN Theatre

SOUTH AUSTRALIA

Private Hospitals

Ashford Community Hospital
Nicole Russell-Higgins, CN Theatre
Blackwood Hospital
Dani McKenna, Clinical Manager Theatre
Burnside War Memorial Hospital
Meriel Wilson, Manager Medical Records
Calvary Central Districts Hospital
Linda Keech, CN Theatre
Calvary Hospital Adelaide Inc
Adele Alves, CN Orthopaedic Theatre
Calvary Wakefield Hospital
Evelyn Carroll, CN Orthopaedic Theatre

SOUTH AUSTRALIA continued

Private Hospitals

Flinders Private Hospital
Judy Parmiter, CN Theatre
Glenelg Community Hospital
Jan Lewanndowski, CN Orthopaedic Theatre
North Eastern Community Hospital
Maria Young, RN Theatre
Parkwynd Private Hospital
Helen Madigan, CN Orthopaedic Theatre
Sportsmed SA
Sarah Gold, Medical Records
St Andrew's Private Hospital
Mark Williams, RN Theatre
Stirling & District Hospital
Nick Clarke, CNC Theatre
The Memorial Hospital
Katrina Smith, Orthopaedic Liaison
Western Community Hospital
Margaret Witts, RN Theatre

AUSTRALIAN CAPITAL TERRITORY

Private Hospitals

John James Memorial Hospital
Elaine Bell, ADON Theatre
Helen Bustard, CNC Theatre
The National Capital Private Hospital
Kaye Vian, NUM Orthopaedic Theatre

Public Hospitals

The Canberra Hospital
Michael Gower, CNS Orthopaedic Theatre
Mary Ann Brook, CNS Orthopaedic Theatre

Public & Private Hospitals

Calvary Health Care
Tina Forshaw, CN Theatre

NORTHERN TERRITORY

Public Hospitals

Alice Springs Hospital
Samantha Arbuthnot, CNM Operating Theatre & Day Procedure Unit
Royal Darwin Hospital
Vivian Dunlop, NUM Theatre

Private Hospitals

Darwin Private Hospital
Barbara Kulbac, RN Theatre

Participating Hospitals & Coordinators – continued

WESTERN AUSTRALIA

Public Hospitals

Albany Regional Hospital
Heather Watson, RN Theatre
Armadale Health Service
Eleri Griffiths, Theatre Service Manager
Bunbury Regional Hospital
Brett Smith, Orthopaedic Technician Theatre
Fremantle Hospital
Steven Johnson, Orthopaedic Technician Theatre
Fremantle Kayleeya Hospital
Lyn Burns, CN Orthopaedic Theatre
Geraldton Health Service
Vicki Richards, CN Theatre
Kalgoorlie Regional Hospital
Karen Whittaker, Clinical Manager Theatre
Osborne Park Hospital
Jenny Misiewicz, RN Theatre
Royal Perth Hospital, Shenton Park
Lesley Pascoe, RN Theatre
Royal Perth Hospital, Wellington St
Carmel McCormack, NUM Theatre
Sir Charles Gairdner Hospital
Sandra Miller, Quality Improvement Coordinator

Private Hospitals

Coastal Private Hospital
Glenda Laycock, RN Theatre
Hollywood Private Hospital
Judith Corbett, RN Theatre
Joondalup Health Campus
Sue-Ann Hall, Health Record Officer
Mercy Hospital Mt Lawley
Robyn Lawson, ADON Operating Theatres
Stuart Meek, Orthopaedic Technician
Mount Hospital
Jackie McDonald, Orthopaedic Coordinator
Peel Health Campus
Jan Birmingham, RN Orthopaedic Theatre
St John of God Health Care, Bunbury
Marianne Viebke, NUM Theatre
Stephanie Dwyer, Administration Assistant
St John of God Health Care, Geraldton
Vicki Doig, CN Theatre
St John of God Health Care, Murdoch
Paul Maloney, Orthopaedic Technician Theatre
St John of God Health Care, Subiaco
Derek Williams, Orthopaedic Technician Theatre

TASMANIA

Public Hospitals

Launceston General Hospital
Paul Van nynanten, CN Orthopaedic Theatre
North West Regional Hospital, Burnie Campus
Bill Kerr, CN Orthopaedic Theatre
North West Regional Hospital, Mersey Campus
Grace Kamphuis, NUM Theatre
Royal Hobart Hospital
Dianne Chugg, RN Theatre

TASMANIA

Private Hospitals

Calvary Health Care St Luke's Campus
Kerri Foster, Patient Information Services
Garry Stratton, CNC Theatre
Calvary Hospital
Jane Walker, CNS Orthopaedic Theatre
Hobart Private Hospital
Sarah Bird, Perioperative Services Manager
North-West Private Hospital
Linda Wynwood, Theatre Manager
St Vincent's Hospital
Ann Boot, NUM Theatre
Louise Brooker, Theatre Receptionist

QUEENSLAND

Public Hospitals

Bundaberg Hospital
David Levings, Acting NUM Theatre
Cairns Base Hospital
Debbie Norris, Department of Orthopaedics
Gold Coast Hospital
Allan Davies, NUM Theatre
Hervey Bay Hospital
Shane King, RN Theatre
Ipswich Hospital
Libby McNaulty, NPC Theatre
Logan Hospital
Denise Maher, Director Support Orthopaedics
Mackay Hospital
Kaylene Duguid, RN Theatre
Maryborough Hospital
Heather Zillman RN, Theatre
Mater Misericordiae Public Adult's Hospital
Simon Journeaux, Director of Orthopaedics
Mater Misericordiae Public Children's *Hospital*
Margaret Fletcher, NPM Theatre
Jess Hadley, CN Theatre
Nambour General Hospital
Janine Detlefson, NUM Theatre
Prince Charles Hospital
Sue Grice, Clinical Research Nurse
Princess Alexandra Hospital
Gail Brodrick, RN Orthopaedic Theatre
Queen Elizabeth II Jubilee Hospital
Marilyn Kondai, EN Theatre
Redcliffe Hospital
James Chippendale, Health Information Manager
Redland Public Hospital
Trish O'Farrell, RN Theatre
Rockhampton Base Hospital
Liz Murphy, CN Orthopaedic Theatre
Royal Brisbane & Womens Hospital
Annette Flynn, Department of Orthopaedics
Toowoomba Hospital
Mandy Robinson, RN Theatre
Anita Lau, RN Theatre
Townsville Hospital
Sharon Cooke, RN Orthopaedic Theatre

Participating Hospitals & Coordinators – continued

QUEENSLAND continued

Private Hospitals

Allamanda Private Hospital
Maragaret Law, NUM theatre
Brisbane Private Hospital
Liz Drabble, Operational Manager
Caboolture Hospital
Sue Adams, NUM Theatre
Craig Gater, CNC Theatre
Cairns Private Hospital
Pat Warburton, RN Theatre
Caloundra Private Hospital
Christine Wells, CN Theatre
Friendly Society's Hospital
Anne Whalley, Theatre Receptionist
Gold Coast Hospital, Robina Campus
Moira Briggs, NUM Perioperative Services
Melissa Waters, CN Theatre
Greenslopes Private Hospital
Jodie Baptie RN, Lisa Yong, RN Theatre
Hervey Bay Surgical Centre
Natalie Short, RN Theatre
Hillcrest Rockhampton Private Hospital
Lyn Martin, NUM Theatre
Holy Spirit Northside Hospital
Molly Harmer, CNC Orthopaedic Theatre
John Flynn Hospital
Paula Archer, CN Orthopaedic Theatre
Mater Misericordiae Hospital Bundaberg
Monica Mooney, CN Orthopaedic Theatre
Mater Misericordiae Hospital Mackay
Paul Lanigan, CNC Theatre
Mater Misericordiae Hospital Rockhampton
Lorelei Thomas, RN Theatre
Mater Misericordiae Hospital Townsville
Regina Hansen, CN Theatre
Mater Misericordiae Private Hospital
Ann Hayward, RN Theatre,
Chris Tyrrell, RN Theatre
Mater Private Hospital Redland
Erina Harris, RN Theatre
Nambour Private Hospital
Yvonne Hemingway, RN Theatre
Noosa Hospital
Janet McMeekin, RN Theatre
North West Private Hospital
Lyndal Schnitzerling, Clinical Coordinator Theatre
Peninsula Private Hospital
Janene Stewart, NUM Theatre
Samantha Carney, CN Theatre
Pindara Private Hospital
Anne Brennan, CN Orthopaedic Theatre
Pioneer Valley Hospital
Pam Barrett, Theatre Services Coordinator
St Andrew's Private Hospital
Brenda Stephens, Theatre Reception
St Andrew's Hospital, Toowoomba
Judith Knight, Manager Perioperative Services
St Andrew's War Memorial Hospital
Kathy Flanigan, Theatre Secretary

QUEENSLAND continued

Private Hospitals

St Stephen's Private Hospital
Sheila Jensen, RN Theatre
St Vincent's Hospital
Judy Plotecki, RN Perioperative Services
Sunnybank Private Hospital
Dianne Cossor, Theatre Inventory Control Officer
The Sunshine Coast Private Hospital
Sheree Bailey RN Theatre,
Chantalle Harrison, RN Theatre
The Wesley Hospital Townsville
Joanne Humphreys, CN Orthopaedic Theatre
Wesley Hospital
Carolyn Wilson, CNM Ward 2M

VICTORIA

Public Hospitals

Austin Health
Ross Kentish, ANUM Orthopaedic Theatre
Ballarat Health Services
Jan Walsh, ANM/Equipment, Operating Suite
Bass Coast Regional Health, Wonthaggi Hospital
Gail Huitema, NUM Theatre
Bendigo Health Care Group
Dot Smith, Assoc NUM Orthopaedic Theatre
Box Hill Hospital
Helga Ploschke, Quality Coordinator Orthopaedic Services
Cohuna District Hospital
Elizabeth Storm, NUM Theatre
Colac Area Health
Amanda Tout, NUM Theatre
Dandenong Hospital
Karen Ferguson, RN, Paul Chung, RN Theatre
Djerriwarrh Health Services
Bacchus Marsh Campus
Linda Aykens, NUM Theatre
East Grampians Health Service
Brian Lomax, NUM Theatre
Echuca Regional Health
Anne Dick, Associate Charge Nurse Theatre
Goulburn Valley Health
Denise Feehan, Preadmission/Admission Clinic
Latrobe Regional Hospital
Sheryl Farmer, AUM Theatre
Maroondah Hospital
Kim Leslie, Associate NUM Theatre
Mildura Base Hospital
Gwenda Smith, NUM Theatre
Monash Medical Centre, Clayton Campus
David Robertson, A/CN Orthopaedic Theatre
Monash Medical Centre, Moorabbin Campus
Sue Rosalie, A/CN Orthopaedic Theatre
Northeast Health Service Wangaratta
Cathy Mills, Ward Clerk, Theatre Reception
Peninsula Health Service, Frankston Hospital
Samantha Maxwell, NUM Theatre
Portland District Health
Julie Sealy, NUM Theatre

Participating Hospitals & Coordinators – continued

VICTORIA continued

Public Hospitals

Sandringham & District Memorial Hospital
Melanie Ramsden, Coord Orthopaedic Clinic
South West Healthcare Warrnambool Campus
Tony Kelly, NUM Theatre
St Vincent's Public Hospital
Kim Thomson, ANUM Orthopaedic Theatre
Stawell District Hospital
Chris Shorten, NUM Theatre
Sunshine Hospital
Joy Curley, RN Theatre
Swan Hill District Hospital
Helen Wilkins, CNC Theatre
The Alfred
Caroline McMurray, Coordinator Orthopaedic Dept
The Geelong Hospital, Barwon Health
Lee Rendle, ANUM Theatre
The Northern Hospital
Siew Perry, AUM Theatre
The Royal Melbourne Hospital
John Carr, RN Operating Theatre
West Gippsland Healthcare Group
Christine Evans, CAN Theatre
West Wimmera Health Service
Maree Markby, NUM Theatre
Western District Health Service
Mark Stevenson, NUM Theatre
Western Hospital
Wayne Lehman, RN Theatre
Vicki Mahaljcek, RN Theatre
Kathy Buckley, Secretary, Orthopaedic Dept
Williamstown Hospital
Maureen Clark, ACN Theatre
Wimmera Health Care Group
Pam Muszkieta, NUM Theatre

Private Hospitals

Beleura Private Hospital
Jean Leyland, RN Theatre
Bellbird Private Hospital
Vanessa Keane, Orthopaedic Case Manager
Cabrini Health, Malvern
Deborah Fleckner, Assist Hosp Project Manager
Como Private Hospital
Joanne Parks, NUM Theatre
Cotham Private Hospital
Susan Leech, RN Orthopaedic Theatre
Epworth Hospital
Tilak Weerakkody, RN Theatre
Epworth Eastern Hospital
Natasha Hart, ANUM Theatre
Epworth Freemason Hospital
Claudia Nozzolillo, CNS Orthopaedic Theatre
Essendon Private Hospital
Chan Leong, NUM Theatre
Geelong Private Hospital
Colin Hay, ANUM Orthopaedic Theatre
John Fawkner Hospital
Jenny Collins, ANUM Orthopaedic Theatre

VICTORIA continued

Private Hospitals

Knox Private Hospital
Sally Thomas, Orthopaedic Liaison Nurse
Latrobe Private Hospital
Jenny Telfer, NUM, Charm D'Cruz, RN Theatre
Linacre Private Hospital
Melissa Dillon, NUM Orthopaedic Theatre
Maryvale Private Hospital
Janine Johnston, A/CN Orthopaedic Theatre
Masada Private Hospital
Jenny Hodges, RN, Pam Lescohier, RN Theatre
Melbourne Private Hospital
Fran Bartholomew, RN Orthopaedic Theatre
Mildura Private Hospital
Elizabeth Collihole, ACN Theatre
Mitcham Private Hospital
Julie Nankivell, RN, Judith Bond, RN Theatre
Mount Waverly Private Hospital
Marian Burns, NUM Theatre
Mountain District Hospital
Rosslyn Martin, NUM Theatre
Northpark Private Hospital
Fiona Webster,ANUM Theatre
Peninsula Private Hospital
Ruth Honan, ANUM Orthopaedic Theatre
Ringwood Private Hospital
Carol Burns, ANUM Theatre
Shepparton Private Hospital
Victoria Londrigon, CNS Orthopaedic Theatre
South Eastern Private Hospital
Maureen Macey, NUM Theatre
St John of God Health Care, Ballarat
Cameron Morgan, Resource Manager
St John of God Health Care, Bendigo
Jenny Dillon, ACN Theatre
St John of God Health Care, Geelong
Angie Patterson, CNS Orthopaedic Theatre
St John of God Health Care, Warrnambool
Gill Wheaton, NUM Theatre
Leanne McPherson, ANUM Theatre
St Vincent's and Mercy Private Hospital, Mercy Campus
Margaret Scanlon, ANUM Theatre
St Vincent's and Mercy Private Hospital, St Vincent's Campus
Monique Duncan, CNS Orthopaedic Theatre
The Avenue Hospital
Annellen Watson, RN Theatre
The Valley Private Hospital
Sandra Curtis, NUM Perioperative Services
Vaucluse Hospital
Lesley Gilbert, Perioperatve Services Manager
Vimy House Private Hospital
Margaret Baker, NUM Theatre
Wangarratta Private Hospital
Cathy Duncan, NUM Theatre
Warringal Hospital
Judy McIvor, RN Theatre
Western Private Hospital
Vicki Canning, NUM Theatre

Participating Hospitals & Coordinators – continued

NEW SOUTH WALES

Public Hospitals

Albury Base Hospital
Elwyn Black, A/ NUM Theatre
Armidale Hospital
Debbie Spokes, NUM Theatre
Bankstown/Lidcombe Hospital
Mia Cabaltera, Orthopaedic Resource Person
John Mati, Orthopaedic Resource Person
Bega District Hospital
Pauline Blair, RN Theatre
Blacktown Hospital
Cathy Jiear, NUM Theatre
Sergio Jumanong, RN Theatre
Blue Mountains District ANZAC Memorial Hospital
Cathy Gallimore, NUM Theatre
Bowral and District Hospital
Barbara Walsh, NUM Theatre
Broken Hill Health Service
Sue Beahl, RN Theatre
Campbelltown Hospital
Bev Hill, CNS Orthopaedic Theatre
Canterbury Hospital
Jenny Cubit, NUM Theatre
Coffs Harbour Health Campus
Eric Dorman, NUM Theatre
Concord Repatriation Hospital
Cathy Montgomery, CNS Theatre
Monique Prowse, CNS Theatre
Dubbo Base Hospital
Cathy Chapman, Theatre Clerk
Celia Talor, Theatre Clerk
Fairfield Hospital
Stella George, NUM Theatre
Gosford Hospital
Sandra Smith, Set-up Coordinator Theatre
Goulburn Base Hospital
Debbie Mallon, NUM Theatre
Hornsby & Ku-Ring-Gai Hospital
Bessie Chu, CNS Theatre
Institute of Rheumatology and Orthopaedic Surgery
Alex Vesley, NUM Theatre
John Hunter Hospital
Pam Arnold, NUM Equipment Theatre
Lismore Base Hospital
Val Armstrong RN Orthopaedic Theatre
Glen Nettle RN, Orthopaedic Theatre
Liverpool Health Service
John Murphy, NUM Operating Theatre

NEW SOUTH WALES continued

Public Hospitals

Maitland Hospital
Gwyn Harbrow, NUM Theatre
Manly District Hospital
Karen Jones, NUM Theatre
Manning Region Referral Hospital
Graham Cooke, RN Theatre
Mona Vale Hospital
Rebecca Kristensen, CN Orthopaedic Theatre
Mt Druitt Hospital
Glennis Elliot, SNM Theatre
Murwillumbah District Hospital
Lynne Penglase, NUM Theatre
Nepean Hospital
Jenny Smith, CNC Orthopaedic Ward
Alan Muir, Orthopaedic Loan Coordinator
Orange Health Service
Brad Molemkamp, NUM Theatre
Royal Newcastle Centre
Rosalee Baird, NUM Theatre
Royal North Shore Hospital
Eileen Cole, Dept of Orthopaedics
Royal Prince Alfred Hospital
Helen Wright, NUM Theatre
Ryde Hospital
Karen Jones, NUM Theatre
Shoalhaven Group Hospital
Miep Mulder, NUM,
Dale Lindsay, A/NUM Theatre
St George Hospital
Simon Cheng, CNS Orthopaedic Theatre
St Vincent's Public Hospital
Mary Theresa Butler, NUM Perioperative Services
Sutherland Hospital
Andrew Turner, RN Theatre
Sydney Hospital & Sydney Eye Hospital
Greg Burrow, Director of Orthopaedics
Tamworth Base Hospital
Kevin Attart, RN Theatre
The Prince of Wales Hospital
Phyllis Davis, NUM Theatre
Tweed Hospital
Amanda Budd, CNS, Gail Bennet, CNS Theatre
Wagga Wagga Base Hospital
Alison Giese, CNS Orthopaedic Theatre
Melissa Chapman, CNS Orthopaedic Theatre
Westmead Hospital
Dana Bowker, RN Theatre
Elizabeth Stefidas, NUM Theatre
Wollongong Hospital
Jacqui McGovern, CNS Orthopaedic Theatre
Wyong Hospital
Janice Cunningham, A/NUM Theatre
Marilyn Randall, CNS Orthopaedic Theatre

Participating Hospitals & Coordinators – continued

NEW SOUTH WALES continued

Private Hospitals

Albury Wodonga Private Hospital
Beverly Francis, CNS Orthopaedic Theatre
Armidale Private Hospital
Cheryl Constance, NUM Theatre
Baringa Private Hospital
Marilyn Chauncy, Orthopaedic Resource Manager
Berkely Vale Private Hospital
Michelle Turner, QA/Education Coordinator
Brisbane Waters Private Hospital
Sue Mcleod, Coordinator Orthopaedic Services Theatre
Calvary Health Care Riverina
Joanne Kuiper, Clinical Coder-Casemix Coord
Calvary Hurstville Community Private Hospital
Kathryn Boyce, Orthopaedic Case Manager
Canada Bay Private Hospital
Ruth Wigley, NUM Theatre
Cape Hawk Community Private Hospital
Julie Bate, NUM Theatre
Delmar Private Hospital
Ingrid Statis, RN Theatre
Dubbo Private Hospital
Gail Priest, NUM Theatre
Dudley Private Hospital
Louise Johnson, RN Operating Theatre
Cathy Lanser, RN Operating Theatre
Figtree Private Hospital
Jan Goldrick, Theatre
Hawkesbury Health Service
Brigitte Lewis, CNS Theatre
Holroyd Private Hospital
Krys Maj, NUM Theatre
Hunter Valley Private Hospital
Margaret Water, NUM Theatre
Michael Summerville, RN Theatre
Hunters Hill Private Hospital
Jenny May, CNS Orthopaedic Theatre
Kareena Private Hospital
Gail O'Connor, NUM Theatre
Lake Macquarie Private Hospital
Robert Reddie, Theatre
Lingard Private Hospital
Jo Bryan, NUM Theatre
Mayo Private Hospital
Ms Ellie Richardson, NUM Theatre
Nepean Private Hospital
Jan Wernert, NUM Theatre
Newcastle Private Hospital
Fiona McDonald, RN Theatre,
North Gosford Private Hospital
Claire Monger, RN Orthopaedic Theatre
North Shore Private Hospital
Eileen Cole, Department of Orthopaedics
Nowra Community Private Hospital
Jo Naughton, NUM Theatre
Port Macquarie Base Hospital
Pam Campbell, NUM Theatre
Joanne Wright, Theatre Clerk

NEW SOUTH WALES continued

Private Hospitals

Port Macquarie Private Hospital
Susie Storm, CNS Orthopaedic Theatre
Shellharbour Private Hospital
Liz Quennel, Medical Records
Southern Highlands Private Hospital
Karen Cooper, NUM Theatre
St George Private and Medical Centre
Richard Ibarra, NUM Theatre
St Luke's Hospital
Pauline Morely, NUM Theatre
Virginia Johnston, A/NUM Theatre
St Vincent's Private Hospital Bathurst
Diane Carter, RN Theatre
St Vincent's Private Hospital Darlinghurst
Astiness Kalach, Health Information Manager
St Vincent's Private Hospital Lismore
Janelle Hospers, RN Pre admission Clinic
Strathfield Private Hospital
Donna Reichel, Perioperative Manager
Sydney Adventist Private Hospital
Bronwyn Stewart, CNS Theatre
Sydney Private Hospital
Kerry Willink, NUM Theatre
Sydney Southwest Private Hospital
Margaret Flavelle, Orthopaedic Case Manager
Tamara Private Hospital
Lisa Wallet, CNS Orthopaedic Theatre
The Hills Private Hospital
Julie Guthrie, Clinical Orthopaedic Coordinator
The Mater Hospital
Toni Cummins, RN Theatre
The Prince of Wales Private Hospital
Angela Grein, Specialty Team Leader Orthopaedics
Toronto Private Hospital
Sonia McElhinney, Executive Assistant
Warners Bay Private Hospital
Annette Harrison, CNS Theatre
Westmead Private Hospital
Leonna Higgins, CNS Orthopaedic Theatre

Participating Hospitals that have since commencement ceased Joint Replacement

Riverview Private Hospital	*QLD*
Hartwell Private Hospital	*VIC*
Cabrini Private Brighton	*VIC*
Northern Yorke Peninsula	*SA*
Abergeldie Hospital	*SA*
Dalcross Private Hospital	*NSW*
Macarthur Private Hospital	*NSW*
Logan Private Hospital	*QLD*
Mosman Private Hospital	*NSW*
Galliers Private Hospital	*WA*
Gawler Health Services	*SA*
Repatriation Hospital, Heidelberg	*VIC*
Auburn Health Service	*NSW*
Gladstone Hospital	*QLD*

EXECUTIVE SUMMARY

The intention of this summary is to highlight some of the major findings of this report. This is the largest report prepared by the Registry and there are a number of differences from previous reports.

The report has been divided into more self-contained chapters relevant to the different categories of prostheses. There has been an increased focus on differences in outcomes related to patient characteristics such as age and gender. The comparative analysis of revision rates for the different prostheses categories and types has been strengthened by the inclusion of the Yearly Cumulative Revision Rate tables. Examination of these tables allows for comparison of revision rate at yearly intervals.

Additionally the Registry has provided some early outcome results of revision procedures. This is a particularly complex area of analysis. Many of the revisions recorded by the Registry have been undertaken on procedures prior to the commencement of the Registry. For a variety of reasons the analysis of the revision outcomes has been confined to those revisions where the Registry also has information on the initial primary procedure.

It is evident from this report that the number of hip and knee replacements undertaken each year is continuing to increase at a high rate. If this rate continues which it appears likely to do then the number of hip and knee replacements undertaken each year will double by 2016.

In recent years there has been a decrease in the proportion of revision hip and knee replacement procedures being undertaken. This trend has continued in 2005. It is evident that changing practice in response to previous reports is in part responsible for this reduction.

There are a number of major findings with respect to partial hip replacement. There has been a significant reduction in the use of Austin Moore prostheses and increased use of unipolar modular prostheses. The use of cement fixation in all categories of partial hip replacement has been shown to significantly reduce the risk of revision.

In primary conventional total hips there is increasing use of cementless fixation which is in contrast to the better outcomes achieved with cemented and hybrid fixation identified in all age groups but most evident in the individuals over 75 years of age.

There is increased use of resurfacing procedures but there is also considerable state and territory variation in its use. The outcome of resurfacing procedures is very much dependant on patient selection with higher rates of revision in women and men over the age of 65 years of age.

The outcome of revision hips is dependent on the type of revision procedure undertaken. Minor revisions are at a greater risk of further revision than major revision procedures.

In knee replacement more information on the increasingly used patella trochlear procedures is provided. As with other forms of partial knee replacement these procedures have a higher risk of revision compared to primary total knee replacement.

There is decreasing use of unicompartmental knee replacement. This type of knee replacement has a significantly higher revision rate than primary total knee. The outcome of unicompartmental knee procedures is very much dependent on age with younger patients being revised more frequently. In the under 55yr age group 12.8% of all unicompartmental knee replacements are revised at 4 years.

The effect of age on the risk of revision is also evident for primary total knee but not to the same extent as with unicompartmental knee replacement. There is little difference in outcome related to fixation of total knees. The revision rate is significantly increased when a patella resurfacing is not undertaken as part of the primary procedure.

As with revision hip procedures there is considerable variation in outcome depending on the type of revision knee procedure undertaken. Minor revisions are revised more frequently than other types of revision procedures. The best outcome for unicompartmental knee revision is conversion to a total knee however 11% of these have undergone a subsequent revision by three years.

Specific prostheses with a higher than anticipated rate of revision compared to other prostheses in the relevant category are identified at the end of each chapter. The Registry has identified an increased number of these compared to previous years.

One of the difficulties in identifying differences in revision rates is the large number of different prostheses being used. Many of these are used in small numbers. The situation is further complicated in total hip replacement by the practice of mixing and matching femoral and acetabular components from different hip prostheses

The performance of these combinations varies significantly. A femoral or acetabular component that has a low revision rate when combined with one particular prosthesis can have a significantly different revision rate when combined with another.

Currently the Registry has information on over 1,000 different femoral and acetabular combinations for primary conventional total hip replacement. A finding in this years report is that the combined outcome of prostheses and prostheses combinations used in small numbers is significantly higher than commonly used prostheses.

The number of new prostheses being used in 2005 has increased significantly. In previous years the number of individual prostheses being used was in the decline. This increase has not been uniform across all categories of hip and knee replacement. Almost all of the new prostheses are at the high end of the technology market and in particular they are cementless prostheses. No prostheses specific outcomes information is required prior to new prostheses being list so outcomes remain to be determined.

An area of concern is that the when the Registry has examined the outcome of prostheses that have become available since the Registry was established it has not been able to identify any that have performed better than established prostheses. A significant number have higher revision rates. Some of these have been detailed in this report.

Comment

The purpose of the Registry is to enhance outcomes of joint replacement surgery within Australia. It does this by identifying areas where reduction in revision rates can be achieved. This provides surgeons with knowledge to choose the most appropriate course of action at the individual patient level.

The quality and amount of information available to the Registry has enabled it to clearly define some of the factors impacting on outcomes. It has also been able to establish comparative performance of different categories and specific types of prostheses.

It is evident that there are a number of areas where outcomes can be further enhanced particularly with respect to patient and prostheses selection. Effective utilization of Registry information will enhance both of these.

INTRODUCTION

This is the seventh annual report of the Australian Orthopaedic Association National Joint Replacement Registry (AOA NJRR). This Report is based on the analysis of 269,784 hip and knee procedures undertaken in 223,382 patients with a procedure data on or before the 31st December 2005.

The Registry receives information from all hospitals (public and private) undertaking joint replacement. Currently this involves 288 Hospitals but this varies from time to time due to hospital closures, new hospitals opening, or hospitals changing services.

BACKGROUND TO THE REGISTRY

Joint replacement is a commonly performed major procedure that has considerable success in alleviating pain and disability. The rate of joint replacement surgery is increasing rapidly and will continue to do so. For the last ten years there has been an average annual increase of just over 7% each year. Government figures detailed in this Report indicate that over 62,000 hip and knee replacements were performed during the financial year 2004-2005. This compares to 32,000 procedures in 1993-1994. Knee replacement procedures have increased at over twice the rate of hip replacements during this period. The Registry has estimated that expenditure for acute care alone is now approaching $ 1 billion (Australian) per annum.

The outcomes of joint replacement are variable. There are many factors known to influence this. Age, gender and diagnosis of patients, the type prosthesis and the surgical techniques used are just some of these. Superimposed on this, is the rapid rate of change in medical technology. There is continual development and use of new types of prostheses and surgical techniques, the results for many of which remain uncertain.

The Australian Orthopaedic Association recognised the need to establish a National Joint Replacement Registry in 1993. At that time the outcomes of this surgery in Australia were unknown. It was not even clear who was receiving joint replacement or the types of prostheses and techniques being used to implant them. The need to establish a Registry was in part based on the documented success of a number of arthroplasty registries in other countries in particular the Swedish Arthroplasty Registries. The ability to identify factors important in achieving successful outcomes had resulted in both improved standards and significant cost savings.

In 1998 the Commonwealth Department of Health and Aging agreed to fund the Australian Orthopaedic Association to establish the Registry. The Registry began data collection on 1st September 1999. Its continued implementation was then undertaken in a staged manner in each of the Australian states and territories becoming fully national during 2002 (Table NJRR1). The Department of Health and Aging continues to provide the entire funding to maintain the Registry.

The purpose of the Registry is to define, improve and maintain the quality of care of individuals receiving joint replacement surgery. It achieves this by collecting a defined minimum data set that enables outcomes to be determined on the basis of patient characteristics, prosthesis type and features, method of prosthesis fixation and surgical technique used. The principal measure of outcome is revision surgery. It is an unambiguous measure of the need for further intervention. Combined with a careful analysis of the timing and reasons for revision this can be used as an accurate measure of the success or otherwise of a procedure. The Registry also monitors mortality rates. This information is then used to inform surgeons, other health care professionals, governments, orthopaedic companies and the community.

Although the Registry has only been in existence and fully operational for a short time the continual monitoring process inherent in the Registry's function has established that information provided by

the Registry is already influencing joint replacement in a beneficial manner. The major benefit from the Registry however will not be achieved until longer-term outcomes can be established.

AIMS OF THE REGISTRY

- Determine demographic and diagnostic characteristics of patients undergoing joint replacement surgery nationally
- Provide accurate information on the use of different types of prostheses in both primary and revision joint replacements
- Evaluate the effectiveness of different types of joint replacement prostheses and surgical techniques at a national level
- Compare the Australian joint replacement experience to that of other countries
- Provide confidential data to individual surgeons and hospitals to audit their joint replacement surgery
- Educate Australian orthopaedic surgeons in the most effective prostheses and surgical techniques to achieve successful outcomes

REGISTRY MANAGEMENT

The National Joint Replacement Registry is an initiative of the Australian Orthopaedic Association (AOA). At the time it was established the Federal Board of the AOA nominated a specific Registry Committee to develop and manage Registry policies. The committee reports to the Board. Members of the committee include the Chairman, Registry Director and an orthopaedic surgeon from each state and territory (see back of cover for committee members). The Director of the Registry is responsible for the day-to-day management and is also appointed by the Board. In addition the AOA employs a Registry Coordinator who is involved in maintaining cooperation of hospitals, surgeons, government as well as implementing new strategies and coordinating the preparation of the annual report. The Data Management and Analysis Centre, University of Adelaide, is contracted by the AOA to provide data management and analysis services for the Registry.

DATA COLLECTION METHOD

Hospitals provide data on specific Registry forms. The forms are completed in theatre at the time of surgery and are returned to the Registry each month. While initial discussions indicated that most hospitals would prefer to send the information electronically a review of the information collected and the systems used showed that a paper-based system would be more appropriate. The Registry continues to use a paper-based system but has established the mechanisms to collect data electronically when this is feasible for contributing hospitals.

DATA VALIDATION

The Registry validates data collected from individual hospitals by comparing it against data provided by state and territory health departments.

Validation of Registry data against health department unit record data uses a sequential multi-level matching process. An individual level patient/procedure validation has been performed for South Australian, Western Australian, Tasmanian, Australian Capital Territory and Northern Territory data (from September 1999 when hospitals began contributing to the AOA NJRR). Queensland supplies summary data only and negotiations are continuing with New South Wales. The initial matching is performed using hospital and patient identity number with subsequent matching undertaken on relevant procedure codes and appropriate admission time period. “Errors” in data can occur within Government and Registry data at any of these levels, that is, errors in patient identification, coding or admission period attribution by either the hospital or state health department.

Currently the Registry receives information from hospitals on more procedures than are provided by the state health departments. For the period of matching for this report the Registry received 17,816 (14.3%) more forms than

the number of procedures provided in the health department unit record data. The Registry accepts that these additional notifications are valid.

On the initial pass of this validation process, 90.7% of records were an exact match. Note that these percentages do not reflect the capture rate of procedures, but rather the provision of data to the Registry and the adequacy of matching data from several sources in the absence of an industry standard. Subsequent errors in "matching" are managed depending on the nature of the error. Errors within the health department files may have been identified on procedure code, for example a procedure within a specific hospital may be identified as ICD-10-AM code 49318-00 (a primary hip code), and the Registry has received a form for a Primary Knee procedure performed in that hospital on a patient with that unit record number within the specified admission time. Other errors may only be resolved by contacting the original treating hospital, for example, clarification of primary or revision codes or admission times. The validation process also identifies procedures that have not been notified to the Registry. Sufficient information is supplied in the state unit record data (patient unit record number and admission period) to enable the Registry to request procedure details from individual hospitals for these unreported records.

Following the validation process and the retrieval of unreported records, the Registry contains the most complete set of data relating to hip and knee replacement in Australia.

ASSESSING PROSTHESIS PERFORMANCE

An important Registry focus has been the continued development of a standardised algorithm to identify any prosthesis not performing to the level of others in its class. This work is not readily apparent in the Report but is critical to its function. A pragmatic two-stage approach has been developed.

As currently implemented, the *first stage* is an automated system that selects for further attention any component where:

(i) the revision rate (per 100 component years) exceeds twice that for the group, *and*

(ii) the Poisson probability of observing that number of revisions, given the rate of the group, is less than 0.05, *and*

either

(iii) there are at least 10 primary procedures for that component, *or*

(iv) the proportion revised is at least 75% *and* there have been at least 2 revisions.

Additionally, if a component represents more than 25% of the group, its revision rate is excluded from estimation of the group's overall rate. The purpose of this stage is to bring to early attention any prosthesis where there is a performance discrepancy.

In the *second stage*, the Director and Deputy Director of the Registry, the Chairman of the AOA Registry Committee and the Coordinator of the Registry, in conjunction with staff of the Data Management and Analysis Centre, review the findings and decide if mention of a component in the Report is warranted.

Many factors are considered when making this decision. They include amongst others the relevance of the statistical significance of the observed higher revision rate and the presence or absence of any confounding factors. It is known that many different factors may affect the outcome and careful consideration must be given before any particular prosthesis is highlighted. To date a small number of the prostheses identified in the first stage of the algorithm have subsequently been highlighted in the Registry Report. The major reason for not including the majority of identified prostheses is inadequate numbers or the inability to exclude confounding factors. This

algorithm will be subject to change as its performance is reviewed and further data are collected.

Survival Analysis

When the Registry describes the time to revision of a prosthesis using the Kaplan-Meier estimates of survivorship (see Glossary, Appendix 1) we show the curve only while the proportion of prostheses that is at risk for revision is at least 10% of the initial number at risk for that type. This avoids uninformative, imprecise estimates at the right tails of the distribution where the number of primary prostheses at risk is low. However, analytical comparisons of prostheses' survival using log-rank tests and proportional hazards models are based on all available data. (*ref* Pocock SJ, Clayton TC, Altman DG. Survival plots of time to event outcomes in clinical trials: good practice and pitfalls. *Lancet* 2002; 359: 1686-89).

Confidence intervals for the Kaplan-Meier estimates are point-wise Greenwood estimates and their appearance should not be used to infer whether overall differences in survival between prosthesis types are significant. Rather, the log-rank tests and hazard ratios reported with each curve should be used for this purpose.

When, in either text or tables, we refer to the Cumulative Percent Revised (CPR) at a certain time, for example 4 years, we mean the complement (in probability) of the Kaplan-Meier survivorship function at that time, multiplied by 100. The CPR - generically a "cumulative failure rate" - then also accounts for the right censoring due to death and the "closure" of the database at the time of analysis.

ACKNOWLEDGEMENTS

The Registry acknowledges the continued co-operation and support provided by hospitals, orthopaedic surgeons, registrars and nursing staff. The Registry has also continued to receive support and invaluable assistance from the Federal Government, State Health Departments and Orthopaedic Companies.

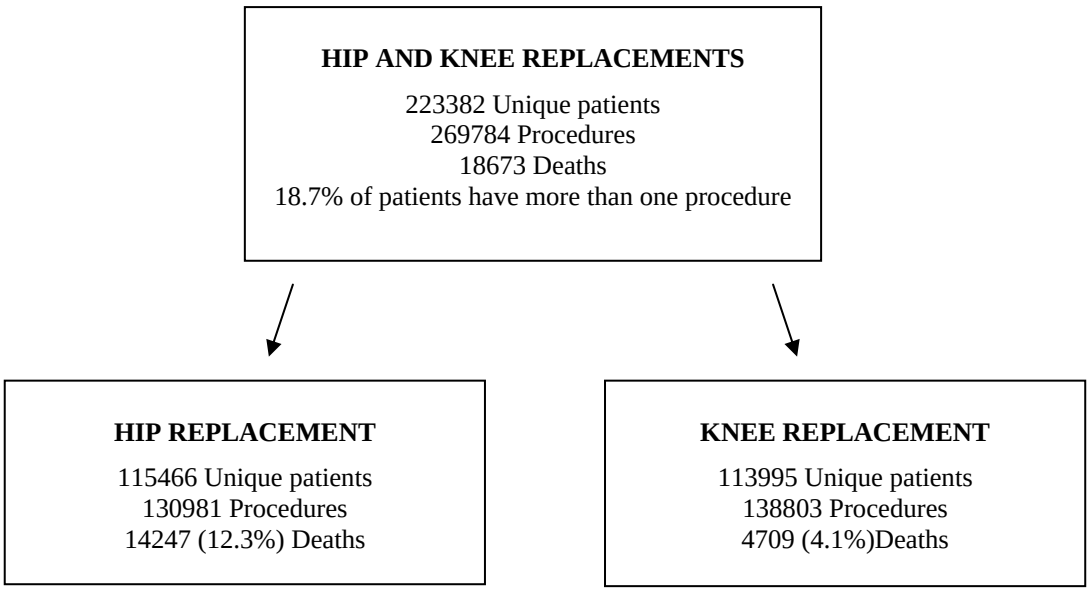
Implementation of National Joint Replacement Registry

Table NJRR1: Dates of implementation by state and territory

	Month/Year commenced	*Majority hospitals participating*
Australia	September 1999	September 2002 99.0% complete national data
New South Wales (NSW)	June 2001	May 2002 96.8% hospitals
Victoria (VIC)	July 2000	May 2001 90.6% hospitals
Queensland (QLD)	April 2000	November 2001 98.1% hospitals
Western Australia (WA)	April 2000	May 2000 80.9% hospitals
South Australia (SA)	September 1999	December 1999 94.5% hospitals
Tasmania (TAS)	September 2000	November 2000 90% hospitals
Australian Capital Territory/ Northern Territory (ACT/NT)	May 2001 October 2000	July 2001 October 2000 100% hospitals

Note: *The Registry was implemented in a staged manner on a state-by-state basis. Table NJRR1 shows the commencement date for each state and a date by which the majority of hospitals for that state were participating. 2003 saw the first full year of complete national data.*

Chart of patients and procedures recorded by the Registry to December 2005



GOVERNMENT JOINT REPLACEMENT DATA 1994 - 1995 to 2004 – 2005

Introduction

The data presented in this section of the Registry Report have been obtained from each state and territory health department. These data provide information on the frequency of joint replacement over the last financial year as well as detailing changes over a ten-year period. These data do not provide any prosthesis or outcome information.

Data Collection Method

Data were obtained for specific ICD-10-AM codes relating to hip and knee joint replacement from the state and territory health departments. Data were obtained for all public and private hospitals that undertake joint replacement from the 1st July 1994 to 30th June 2005. Due to the relatively small number of procedures undertaken in the Australian Capital Territory (ACT) and Northern Territory (NT), it is necessary to combine the figures to ensure anonymity. These data have not been age or sex adjusted.

General Comments

The total number of hip and knee replacement procedures for the twelve-month period from the 1st July 2004 to the 30th June 2005 increased by 5.0% to 62,036 (Table G1 & G2). Tasmania recorded the largest increase (19.9%) in the numbers of hip and knee procedures undertaken for the year (Table G3 and Figure G1).

Data for the last 11 years demonstrate that hip and knee joint replacement surgery has increased by 93.8%. Hip replacement procedures increased by 61.9% and knee replacement by 138.4% (Table G4 and Figure G2). Table G5 details the percentage change of the different types of hip and knee replacement by state and territory. Of the states Queensland had the largest increase (94.1% and 159.5%) hip and knee respectively.

Incidence per 100,000

The incidence of all hip and knee joint replacement procedures for the 2004-2005 year increased to 305.2 per 100,000. The incidence for different types of hip and knee replacement per state is shown in Table G6.

Knee replacement procedures (156.8 per 100,000) continue to have a higher incidence than hip replacement (148.4 per 100,000) (Table G6). The total incidence for hip replacement however includes partial hip replacement usually undertaken for fracture neck of femur. Excluding partial hip replacement gives a more accurate incidence of 120.3 per 100,000 of hip replacement for degenerative conditions such as osteoarthritis. This is a more accurate reflection of the situation and highlights a significant difference between the rates of hip and knee replacement

The state of South Australia continues to have the highest incidence of both hip (181.9 per 100,000) and knee replacement (198.1 per 100,000) for the 2004-2005 year (Table G6).

Hip Replacement

The total number of hip replacements performed in the financial year 2004-2005 was 30,166. This is an increase of 3.4% over the 2003-2004 financial year (Table G2).

The proportions of types of replacement are similar to the previous year and are presented in Table G1. For the 2004-2005 year both partial and revision hip replacement decreased by 3.2% and 3.0% while primary total increased by 6.7% (Table G2).

The proportion of hip replacement procedures that were revisions decreased from 13.4% to 12.6% (Table G1 and Figure G4). It is important to emphasize

this is not the revision rate but is the proportion of hip replacement procedures that are revisions. It is not possible to determine from the health department data which types of hip replacements (partial, primary or revision) have been revised.

Knee Replacement.

The total number of knee replacements recorded by the state governments for the financial year 2004-2005 was 31,870. This is an increase of 6.6% compared to the previous financial year.

The overall proportion of unicompartmental knee replacements (10.2%) was lower than the previous year (11.8%). The number of unicompartmental undertaken decreased by 7.5%. The proportion of knee replacements that were primary total increased to 79.8% from 77.4%, while the proportion of revision knee replacement decreased to 8.6% from 9.8% in the previous year (Table G2).

The proportion of knee replacements that were revision procedures in 2004-2005 was similar to the previous year 8.6% and 8.7% (Table G1). South Australia had the highest percentage of knee revisions (11.2%) (Table G1 and Figure G5). As is the case with hip replacement it is not possible to determine from government data what type of knee replacements were revised.

Private and Public

There has been an increase in both public and private hip and knee replacement during the 2004-2005 financial year. The increase was higher in the private system (5.6%) than in the public system (4.1%) (Table G8 and Figure G6).

Hip replacement increased by 3.4% (2.0% public, 4.7% private) (Table G9, Figure G7). There was a greater increase in knee replacement (6.6%) (7.0% public, 6.4% private) (Table G10 and Figure G8).

The number of hip and knee procedures performed in both public and private for the individual state and territories for the financial years 1997-1998 to 2004-2005 is shown in Figures G9 to G15.

Hip and Knee Replacement

Table G1: Number (percent) of Hip & Knee Replacements Nationally 1/7/2004 - 30/6/2005

Type of joint replacement	*NSW*	*VIC*	*QLD*	*WA*	*SA*	*TAS*	*ACT/NT*	*Aust. total*
Hip replacement								
Partial	1,690	1,489	1,056	558	618	184	97	5,692
	18.1	*17.9*	*21.1*	*18.9*	*22.0*	*18.5*	*13.7*	*18.9*
Primary total	6,584	5,738	3,225	2,023	1,882	701	530	20,683
	70.3	*68.9*	*64.3*	*68.4*	*67.1*	*70.7*	*74.8*	*68.6*
Revision	1,088	1,097	734	378	305	107	82	3,791
	11.6	*13.2*	*14.6*	*12.8*	*10.9*	*10.8*	*11.6*	*12.6*
Total	**9,362**	**8,324**	**5,015**	**2,959**	**2,805**	**992**	**709**	**30,166**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Knee replacement								
Patellar/trochlear	204	84	70	23	48	3	7	439
	1.8	*1.3*	*1.1*	*0.8*	*1.6*	*0.4*	*0.8*	*1.4*
Unicompartmental	1,503	691	273	180	471	66	75	3,259
	13.2	*10.4*	*4.4*	*6.1*	*15.4*	*8.6*	*8.4*	*10.2*
Primary total	8,854	5,227	5,301	2,478	2,194	652	722	25,428
	77.9	*79.0*	*85.2*	*83.6*	*71.8*	*85.3*	*81.3*	*79.8*
Revision	803	612	578	283	341	43	84	2,744
	7.1	*9.3*	*9.3*	*9.5*	*11.2*	*5.6*	*9.5*	*8.6*
Total	**11,364**	**6,614**	**6,222**	**2,964**	**3,054**	**764**	**888**	**31,870**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Hip & KneeTotal	**20,726**	**14,938**	**11,237**	**5,923**	**5,859**	**1,756**	**1,597**	**62,036**

Note: *In some tables entries may not sum to totals due to rounding*

Table G2: Hip and Knee Joint Replacement Percentage Changes 1/7/2004 - 30/6/2005 Relative to 1/7/2003 - 30/6/2004

Type of joint replacement	*Aust. Total 1/7/'02-30/6/'03*	*Aust. Total 1/7/'03-30/6/'04*	*Aust. Total 1/7/'04-30/6/'05*	*Percentage change relative to 2003-2004*
Hip replacement				
Partial	5,660	5,878	5,692	-3.2
Primary total	18,534	19,380	20,683	6.7
Revision	3,639	3,907	3,791	-3.0
Total	**27,833**	**29,165**	**30,166**	**3.4**
Knee replacement				
Patellar/trochlear	303	299	439	46.8
Unicompartmental	3,556	3,525	3,259	-7.5
Primary total	21,540	23,463	25,428	8.4
Revision	2,604	2,612	2,744	5.1
Total	**28,003**	**29,899**	**31,870**	**6.6**
National Total	**55,836**	**59,064**	**62,036**	**5.0**

Table G3: State and Territories Number and Percentage Changes for combined Hip and Knee Replacement 1/7/2004 - 30/6/2005 Relative to 1/7/2003 - 30/6/2004

States and Territories	*State Total 1/7/'02-30/6/'03*	*State Total 1/7/'03-30/6/'04*	*State Total 1/7/'04-30/6/'05*	*Percentage change relative to 2003 – 2004*
NSW	19,763	20,109	20,726	3.1
VIC	13,533	14,287	14,938	4.6
QLD	9,043	10,574	11,237	6.3
WA	5,486	5,682	5,923	4.2
SA	5,195	5,382	5,859	8.9
TAS	1,605	1,465	1,756	19.9
ACT/NT	1,211	1,565	1,597	2.0
National Total	**55,836**	**59,064**	**62,036**	**5.0**

Figure G1: State & Territories Total Joint Replacements 1/7/2003 - 30/6/2004 & 1/7/2004 - 30/6/2005

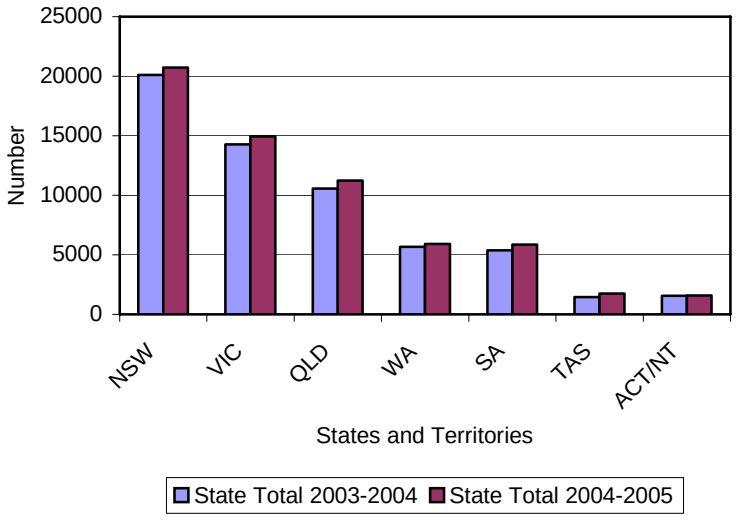


Table G4: Number of Hip and Knee replacement procedures from 1994 - 1995 to 2004 - 2005 with percentage change on previous year.

Year	*Hip replacement N*	*% change*	*Knee replacement N*	*% change*	*Total*	*% change*
1994-1995	18,635	N/A	13,371	N/A	32,006	N/A
1995-1996	19,132	2.7	14,542	8.8	33,674	5.2
1996-1997	20,127	5.2	15,456	6.3	35,583	5.7
1997-1998	21,379	6.2	17,317	12.0	38,696	8.7
1998-1999	21,800	2.0	18,832	8.7	40,632	5.0
1999-2000	22,717	4.2	19,936	5.9	42,653	5.0
2000-2001	24,285	6.9	22,252	11.6	46,537	9.1
2001-2002	26,689	9.9	26,089	17.2	52,778	13.4
2002-2003	27,833	4.3	28,003	7.3	55,836	5.8
2003-2004	29,165	4.8	29,899	6.8	59,064	5.8
2004-2005	30,166	3.4	31,870	6.6	62,036	5.0
***1994/95-2003/04**		**61.9**		**138.4**		**93.8**

Note: *N/A indicates not applicable. Bilaterals are counted as two replacements from 2000-01.*
** % change for entire period 1994-1995 to 2004-2005 is relative to 1994-1995*

Figure G2: Number of hip and knee replacement procedures from 1994 - 1995 to 2004 - 2005

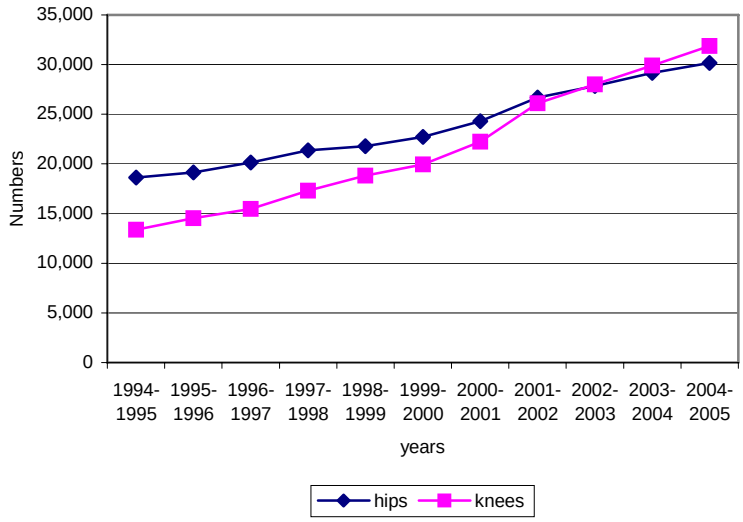


Table G5: Percentage change between 1994 - 1995 to 2004 – 2005 for both hip and knee replacement procedures, by state

Type of joint replacement	*NSW* %	*VIC* %	*QLD* %	*WA* %	*SA* %	*TAS* %	*ACT/NT* %	*Aust total* %
Hip replacement								
Partial	17.5	16.2	65.0	32.5	19.5	60.0	64.4	27.3
Primary total	69.8	83.3	108.1	98.1	60.3	65.3	118.1	81.1
Revision	20.6	48.2	86.3	45.4	-6.4	48.6	67.3	38.2
Total hips	**50.6**	**61.6**	**94.1**	**73.9**	**39.1**	**62.4**	**102.0**	**61.9**
Knee replacement								
Patellar/trochlear	#	#	#	#	#	#	#	#
Unicompartmental	#	#	#	#	#	#	#	#
Primary total	92.8	105.9	145.0	118.9	90.8	120.3	357.0	111.4
Revision	59.0	123.4	147.0	106.6	152.6	186.7	104.9	104.6
Total (all types) knees	**123.0**	**135.2**	**159.5**	**133.6**	**137.7**	**145.7**	**346.2**	**138.4**
Total Hip & Knee	**83.2**	**87.6**	**125.6**	**99.4**	**77.4**	**90.5**	**190.4**	**93.8**

Note: *# indicates not known. Patellar/Trochlear and Unicompartmental data were collected separately for the first time in 1999-2000. Total knees include Patella/trochlear and Unicompartmental*

Incidence of Hip and Knee Replacement for 2004 - 2005

Table G6: Incidence of Hip and Knee Joint Replacement by State & Territory per 100,000 population for 2004 - 2005

Type of joint replacement	*NSW* **Pop.** *6774200*	*VIC* **Pop.** *5022300*	*QLD* **Pop.** *3964000*	*WA* **Pop.** *2010100*	*SA* **Pop.** *1542000*	*TAS* **Pop.** *485300*	*ACT/NT* **Pop** ***528000***	*AUST.* *Pop.* *20328600*
Hip replacement								
Partial	24.9	29.6	26.6	27.7	40.1	37.9	18.4	**28.0**
Primary total	97.2	114.3	81.4	100.5	122.0	144.4	100.4	**101.7**
Revision	16.1	21.8	18.5	18.8	19.8	22.0	15.5	**18.6**
Total	**138.2**	**165.7**	**126.5**	**147.1**	**181.9**	**204.4**	**134.3**	**148.4**
Knee replacement								
Patellar/trochlear	3.0	1.7	1.8	1.1	3.1	0.6	1.3	**2.2**
Unicompartmental	22.2	13.8	6.9	8.9	30.5	13.6	14.2	**16.0**
Primary total	130.7	104.1	133.7	123.2	142.3	134.3	136.7	**125.1**
Revision	11.9	12.2	14.6	14.1	22.1	8.9	15.9	**13.5**
Total	**167.8**	**131.7**	**157.0**	**147.3**	**198.1**	**157.4**	**168.2**	**156.8**
State total	**306.0**	**297.4**	**283.5**	**294.4**	**380.0**	**361.8**	**302.5**	**305.2**

Note: *The Total Australian population includes Cocos (Keeling) Islands, Christmas Island and Jervis Bay Territory.*
The values of the total hip and knee replacement rates per 100,000 population may not equal the sum of the figures due to rounding.

The population figures were obtained from the Australian Bureau of Statistics.
3101.0 Australian Demographic Statistics
EMBARGO: 11:30 AM (CANBERRA TIME) 09/12/2005
JUNE QTR KEY FIGURES, Preliminary Data
www.abs.gov.au/Ausstats/abs@.nsf/Lookup/6949409DC8B8FB92CA256BC60001B3D1

Figure G3: Incidence of Joint Replacement by State & Territories 2004 - 2005

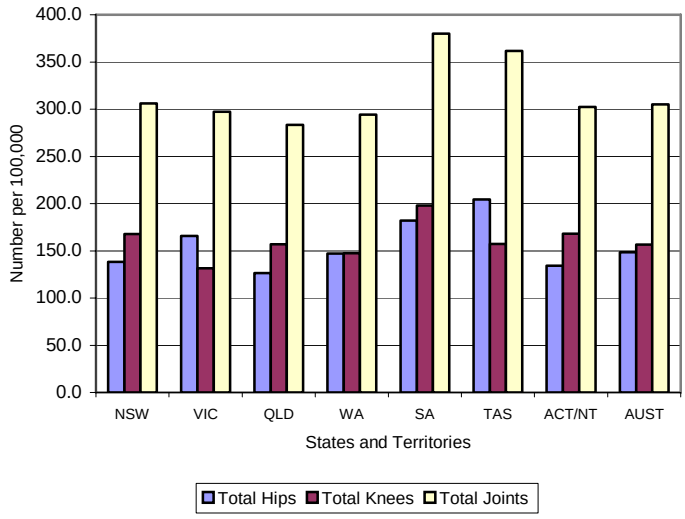


Table G7: Incidence of Different Hip and Knee Joint Replacement Procedures per 100,000 population for Australia from 1997 - 1998 to 2004 - 2005

Type of joint replacement	**1997 - 1998**	**1998 - 1999**	**1999 - 2000**	**2000 - 2001**	**2001 - 2002**	**2002 - 2003**	**2003 - 2004**	**2004 - 2005**
population as at June 30th	*18711300*	*18925900*	*19153400*	*19413200*	*19641000*	*19881500*	*20111300*	*20328600*
Hip replacement								
Partial	26.4	26.8	27.6	28.2	28.5	28.5	29.2	28.0
Primary total	72.4	73.2	74.1	79.2	88.5	93.2	96.4	101.7
Revision	15.5	15.2	16.9	17.7	18.9	18.3	19.4	18.6
Total hips	**114.3**	**115.2**	**118.6**	**125.1**	**135.9**	**140.0**	**145.0**	**148.4**
Knee replacement								
Patellar/trochlear	N/A	N/A	0.9	1.1	1.3	1.5	1.5	2.2
Unilateral	N/A	N/A	11.3	14.4	16.5	17.9	17.5	16.0
Primary total	83.4	90.3	81.4	88.2	103.3	108.3	116.7	125.1
Revision	9.2	9.2	10.4	10.9	11.7	13.1	13.0	13.5
Total knees	**92.5**	**99.5**	**104.1**	**114.6**	**132.8**	**140.8**	**148.7**	**156.8**
Total	**206.8**	**214.7**	**222.7**	**239.7**	**268.7**	**280.8**	**293.7**	**305.2**

Note: ***The incidence for each year may differ slightly from previous years due to updating of the Australian population figures.***
The Total Australian population includes Cocos (Keeling) Islands, Christmas Island and Jervis Bay Territory.
The population figures were obtained from the Australian Bureau of Statistics.
3101.0 Australian Demographic Statistics
EMBARGO: 11:30 AM (CANBERRA TIME) 09/12/2005
JUNE QTR KEY FIGURES, Preliminary Data
www.abs.gov.au/Ausstats/abs@.nsf/Lookup/6949409DC8B8FB92CA256BC60001B3D1

Revision Surgery for 2004 - 2005

Figure G4: Percentage of Revision Hip Replacement 2004 - 2005

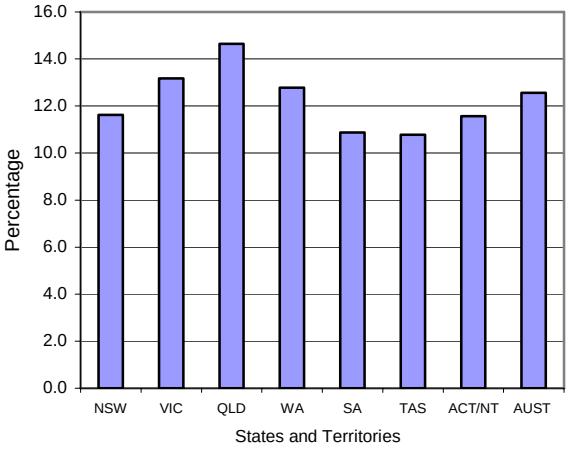


Figure G4 represents, within each state, the percentage of hip surgery that was revision surgery for 2004 - 2005. It is not possible to determine which type (partial, primary or revision) of hip replacement had been revised.

Figure G5: Percentage of Revision Knee Replacement 2004 - 2005

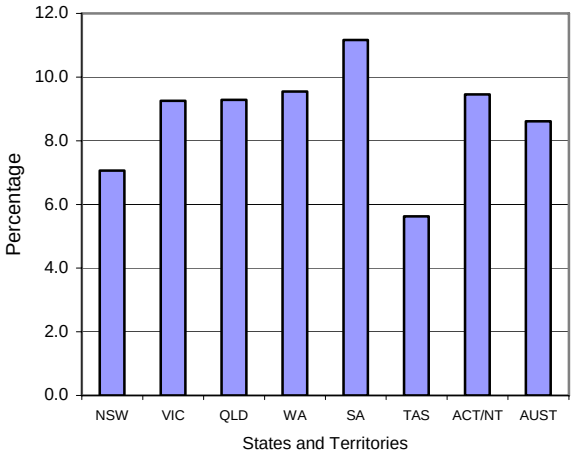


Figure G5 represents, within each state, the percentage of knee surgery that was revision surgery for 2004 - 2005. Primary total or uni as well as revision knee replacements may have been revised.

Public and Private 1997 - 1998 to 2004 - 2005

Table G8: Public & Private Percentage Changes relative to previous year per year for Hip and knee replacement for the last 8 years 1st July - 30th June

Year	*Public*	*Private*	*Total Joints (hip & knee)*
1997-1998	18,777 ***(N/A)***	19,919 ***(N/A)***	38,696 ***(N/A)***
1998-1999	19,195 ***(2.2%)***	21,437 ***(7.6%)***	40,632 ***(5.0%)***
1999-2000	19,193 ***(0.0%)***	23,460 ***(9.4%)***	42,653 ***(5.0%)***
2000-2001	19,290 ***(0.5%)***	27,247 ***(16.1%)***	46,537 ***(9.1%)***
2001-2002	20,851 ***(8.1%)***	31,937 ***(17.2%)***	52,788 ***(13.4%)***
2002-2003	21,797 ***(4.5%)***	34,039 ***(6.6%)***	55,836 ***(5.8%)***
2003-2004	23,070 ***(5.8%)***	35,994 ***(5.7%)***	59,064 ***(5.8%)***
2004-2005	24,022 ***(4.1%)***	38,014 ***(5.6%)***	62,036 ***(5.0%)***

Figure G6: Number of Hip and Knee Joint Replacements at Public & Private Hospitals 1/7/2004 - 30/6/2005

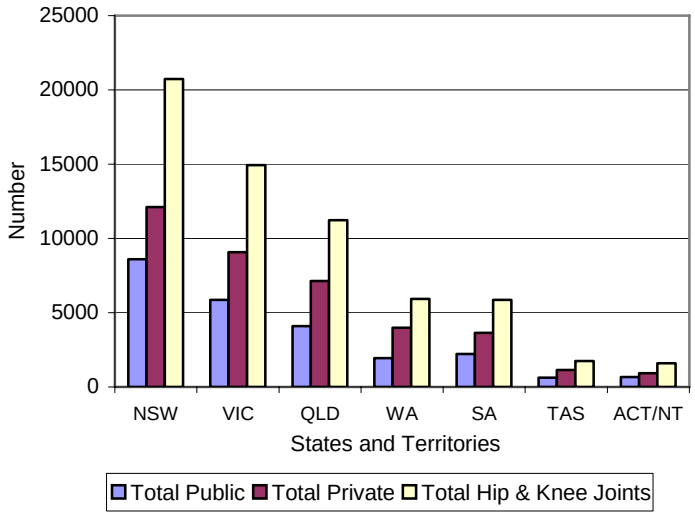


Table G9: Public & Private Percentage Changes for Hip replacement per year for the last 8 years 1st July – 30th June

Year	*Public*	*Private*	*Total (hip)*
1997-1998	11,417 ***(N/A)***	9,962 ***(N/A)***	21,379 ***(N/A)***
1998-1999	11,455 ***(0.3%)***	10,345 ***(3.8%)***	21,800 ***(2.9%)***
1999-2000	11,493 ***(0.3%)***	11,224 ***(8.5%)***	22,717 ***(4.2%)***
2000-2001	11,547 ***(0.5%)***	12,738 ***(13.5%)***	24,285 ***(6.9%)***
2001-2002	12,179 ***(5.5%)***	14,510 ***(13.9%)***	26689 ***(9.9%)***
2002-2003	12,577 ***(3.3%)***	15,256 ***(5.1%)***	27,833 ***(4.3%)***
2003-2004	13,193 ***(4.9%)***	15,972 ***(4.7%)***	29,165 ***(4.8%)***
2004-2005	13,451 ***(2.0%)***	16,715 ***(4.7%)***	30,166 ***(3.4%)***

Figure G7: Number of Hip Joint Replacements at Public & Private Hospitals 1997 - 1998 to 2004 - 2005

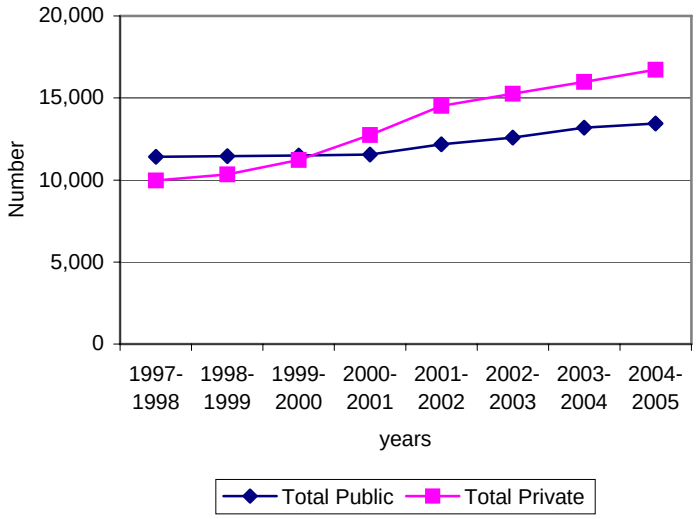


Table G10: Public & Private Percentage Changes for Knee replacement per year for the last 8 years 1st July - 30th June

Year	*Public*	*Private*	*Total (knee)*
1997-1998	7,360 ***(N/A)***	9,957 ***(N/A)***	17,317 ***(N/A)***
1998-1999	7,740 ***(5.2%)***	11,092 ***(11.4%)***	18,832 ***(8.7%)***
1999-2000	7,700 ***(-0.5%)***	12,236 ***(10.3%)***	19,936 ***(5.9%)***
2000-2001	7,743 ***(0.6%)***	14,509 ***(18.6%)***	22,252 ***(11.6%)***
2001-2002	8,672 ***(12.0%)***	17,427 ***(20.1%)***	26,099 ***(17.3%)***
2002-2003	9,220 ***(6.3%)***	18,783 ***(7.8%)***	28,003 ***(7.3%)***
2003-2004	9,877 ***(7.1%)***	20,022 ***(6.6%)***	29,899 ***(6.8%)***
2004-2005	10,571 ***(7.0%)***	21,299 ***(6.4%)***	31,870 ***(6.6%)***

Figure G8: Number of Knee Joint Replacement at Public & Private Hospitals 1997 - 1998 to 2004 - 2005

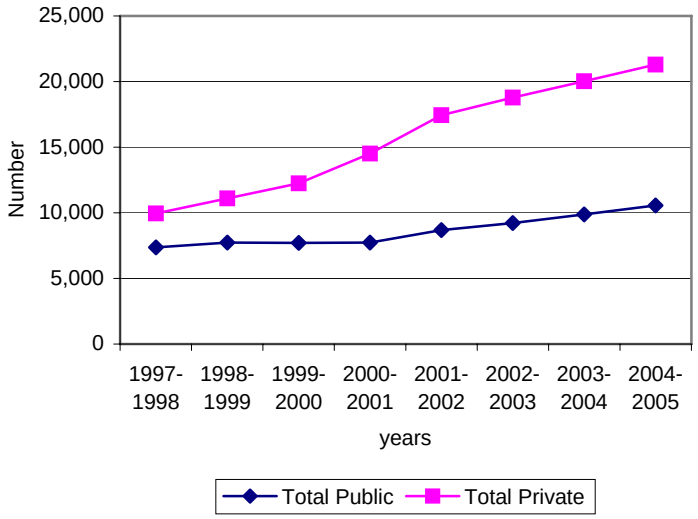


Figure G9: New South Wales - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05

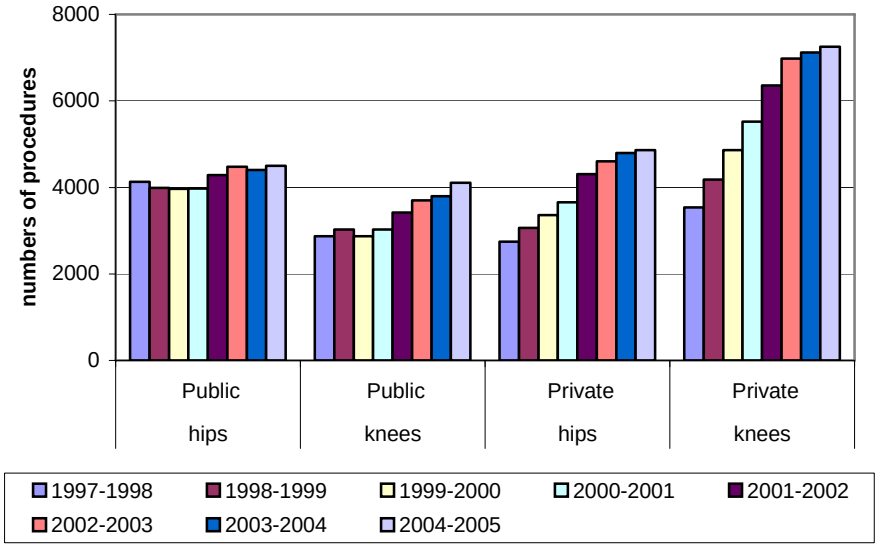


Figure G10: Victoria - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05

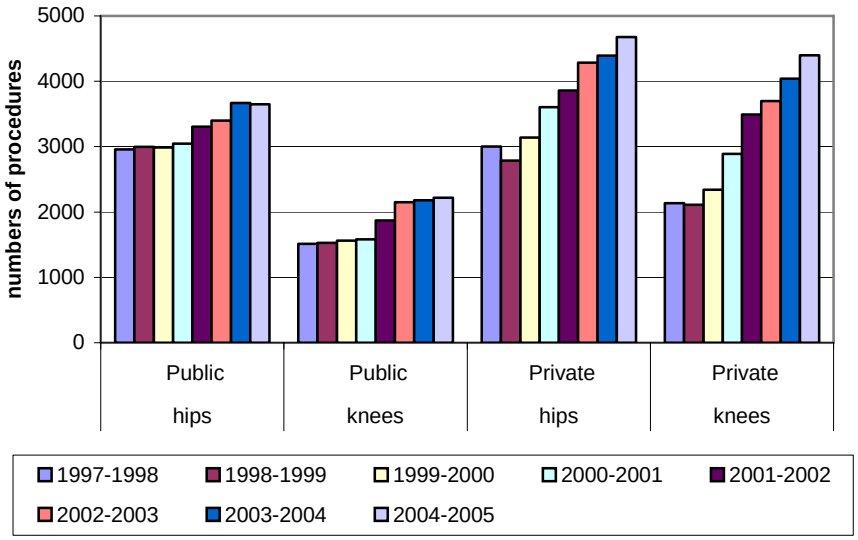


Figure G11: Queensland - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05

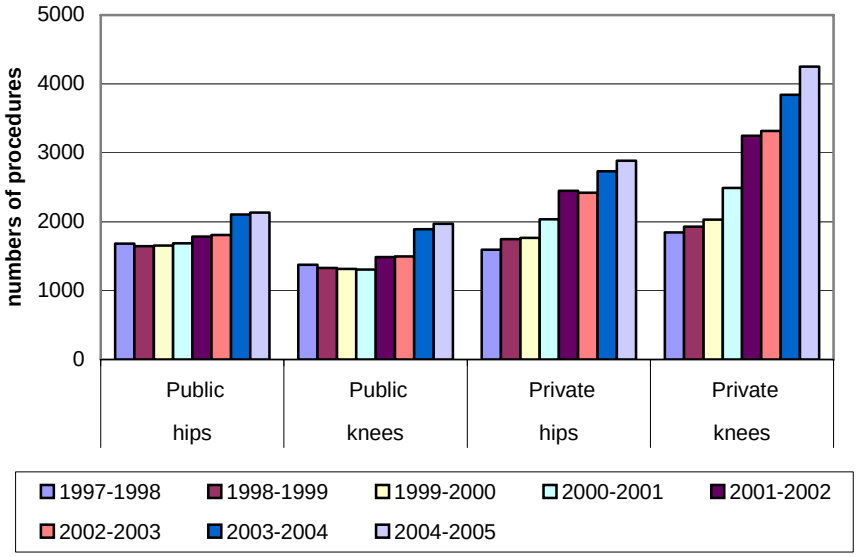


Figure G12: Western Australia - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05

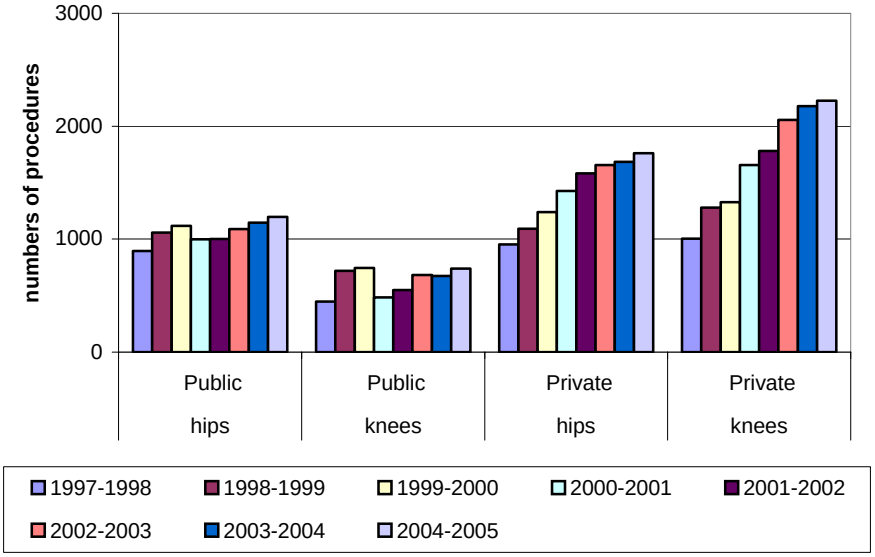


Figure G13: South Australia - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05

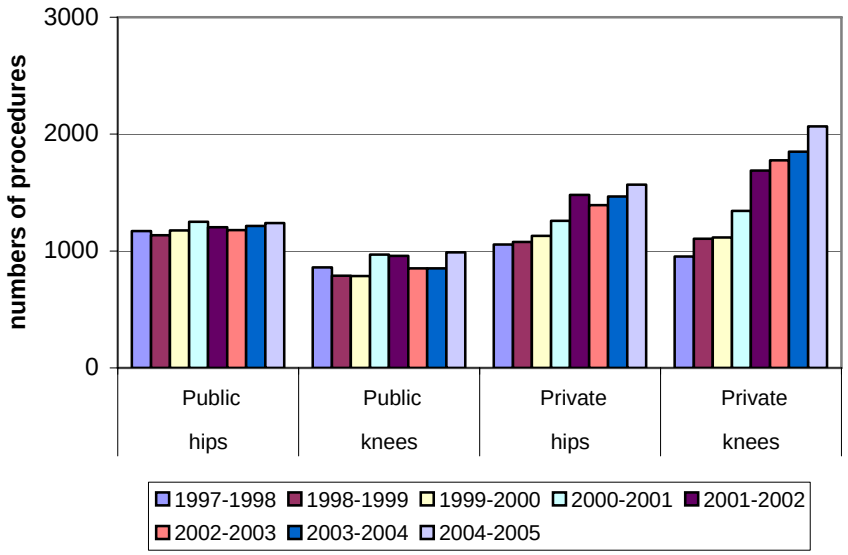


Figure G14: Tasmania - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05

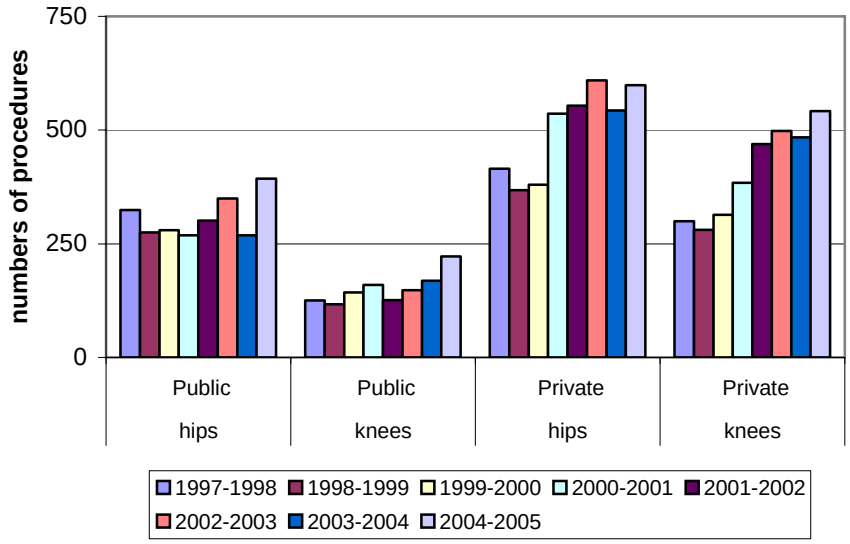
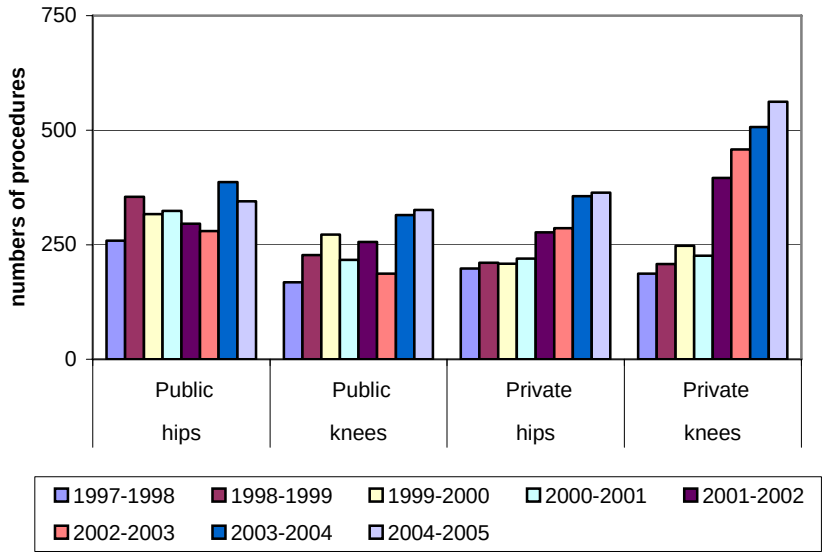


Figure G15: Australian Capital Territory/Northern Territory - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2004 - 05



AOA National Joint Replacement Registry
Hip Replacement Data

General Introduction

This report is based on the analysis of 130,981 primary and revision hip procedures received by the Registry with a procedure date prior to the end of 2005. This is an additional 29,029 hip procedures compared to the 2005 Report.

Categories of Hip Replacement

The Registry categorises hip procedures as either primary or revision procedures. Primary hip procedures are further categorised as partial or total hip replacements. Partial hips are further sub-categorised depending on the type of prostheses used; these are monoblock, unipolar modular and bipolar procedures. Total hips are considered as being conventional, resurfacing or thrust plate procedures.

Revisions are re-operations of other hip procedures. These may be primary partial, primary total or previous revisions. Revision procedures are categorised as major or minor. A major revision involves the removal and/or replacement of a major component. This is defined as a component that interfaces with bone i.e. either the femoral stem or acetabular cup or shell. A minor revision is a revision where a major component has not been removed or replaced. Examples of this include exchange of femoral head and or acetabular insert.

Gender

Women have more hip replacement procedures than men (57% female). There are gender variations depending on the category of hip replacement. Primary total hips replacements are most frequently undertaken in women (53%). Resurfacing and thrust plate procedures are undertaken more frequently in men (71.1%, 72.2% respectively). Partial hip replacement is performed more frequently in women (74.6%).

The majority of individuals undergoing revision operations are women (54.1%) (Table HG1).

During the last five years there has been little change in the proportion of women receiving primary partial hips or primary conventional total hips. There has been a slight reduction in the number of women undergoing resurfacing procedures (Figure HG1).

Age

The mean age for all hip replacement procedures is 69.9 years with women being slightly older than men (71.8 years, 67.4 years respectively). Primary partial hips are generally used in individuals much older than those receiving primary total hips (mean age 81.5 years for partials and 67.0 years for totals). Resurfacing and thrust plate procedures are undertaken in people younger than those having conventional primary total hips (resurfacing 53.4 years, thrust plate 55.9 years and conventional 68.1 years) (See Supplementary Report 2006 on web site).

The mean age for revision procedures is 70.8 years (71.4 years females and 70.0 years males) (See Supplementary report 2006 on web site).

During the last five years there has been no change in the proportion of younger individuals (less than 65 years) receiving primary partial, primary conventional or primary resurfacing procedures (Figure HG2).

Diagnosis

The indication for almost all primary partial hips is fractured neck of femur (94.7%). Osteoarthritis is the major reason for most primary conventional total hip replacements (88.2%) with a slightly higher rate of osteoarthritis in individuals

receiving resurfacing or thrust plate prostheses (93.3%, 93.2% respectively).

The principal cause for revision hip surgery is aseptic loosening (47.7%). There are however differences in diagnoses leading to early revision depending on the types of prostheses used for the primary procedure. Early revisions in primary conventional total hips are commonly due to dislocation where as with resurfacing procedures early revision is most often due to fractures of the neck of femur.

Use of different Categories of Hip Replacement

The most common hip procedure is a primary total hip (70.4% of all hip procedures). Primary partial hips account for 16.9% and revisions 12.7% of all hip procedures (Table HG1).

During the last five years the proportion of primary total hip replacements has increased from 69.8% (2001) to 71.7% (2005). The proportion of primary partial hips has remained constant and revision procedures have decreased from 13.6% (2001) to 12.1% (2005). It is important to appreciate that this change in the proportion of revision procedures is not necessarily indicative of a reduction in the rate of revision. It is a simple measure of the proportion of revision procedures as a percentage of all hip procedures. This proportion is affected by the rate of change of the other types of procedures (Figure HG3).

State Variation in Use

There is state-by-state variation in most categories of hip procedures. South Australia has the highest proportion of partial hips (19.7%) and ACT/NT the lowest (10.8%). The ACT/NT has the highest proportion of primary total hip replacement (79.2% of all hip procedures) and Queensland the lowest (67.7%) (Figure HG3). The proportion of revision procedures also varies. In 2005 in Queensland this was 13.3% and in ACT/NT it was 10.0% (Figure HG3).

Bilateral Primary Hip Procedures

Bilateral primary procedures are when both hips in the same individual have undergone primary hip replacements no matter the type of primary hip replacement or the timing of the second primary hip procedure.

Almost 10% of patients who have had a primary hip replacement have had another primary hip procedure recorded by the Registry at some time subsequent to the initial procedure. Of this group 5.8% have had a same day bilateral primary hip replacement. The most frequent bilateral primary hip replacement is bilateral primary conventional total hip followed by bilateral primary resurfacing hip replacement. Of the individuals who have undergone bilateral conventional primary hip replacements, 4.7% have had this on the same day. The proportion of patients that have had bilateral resurfacing procedures on the same day is 20.6% (Table HG3).

General Comparison of Outcomes

Primary conventional total hips are the least revised primary hip procedure (conventional 2.1%, resurfacing 2.5% and primary partial 2.8%). This difference is also evident when comparing revisions per 100 observed component years (conventional 0.9%, resurfacing 1.2% and primary partial 1.7%) (Table HG4).

Comparison of the cumulative revision rates further highlights the difference in the risk of revision for each of these procedures. This is the proportion of procedures revised at a defined time since the original procedure. At three years the cumulative percentage revision of primary conventional hip replacement is 2.55%, resurfacing 3.12% and primary partial hip 4.26% (Table HG5).

Hip Replacement - 1/9/1999 to 31/12/2005

Definitions

Partial:	*unipolar or bipolar hip replacement*
Primary total:	*primary conventional total hip replacement, resurfacing and thrust plate procedures*
Revision:	*re-operation for exchange or removal of one or more components*

Demographics of patients undergoing Hip Replacement

Table HG1: Number of Hip Replacements by Sex

Type of hip replacement	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
Unipolar Monoblock	9459	75.0	3147	25.0	12606	57.0
Unipolar Modular	2586	74.8	873	25.2	3459	15.7
Bipolar	4435	73.5	1599	26.5	6034	27.3
Primary Partial	**16480**	**74.6**	**5619**	**25.4**	**22099**	**100.0**
Conventional Total	46997	55.4	37875	44.6	84872	92.0
Resurfacing	2084	28.9	5121	71.1	7205	7.8
Thrust Plate	37	27.8	96	72.2	133	0.1
Primary Total	**49118**	**53.3**	**43092**	**46.7**	**92210**	**100.0**
Revision	**9021**	**54.1**	**7651**	**45.9**	**16672**	**100.0**
Total	**74619**	**57.0**	**56362**	**43.0**	**130981**	**100.0**

Note: *In some tables entries may not sum to totals due to rounding*

Figure HG1: Usage of different Type of Hip Replacement by Sex (female) and Year

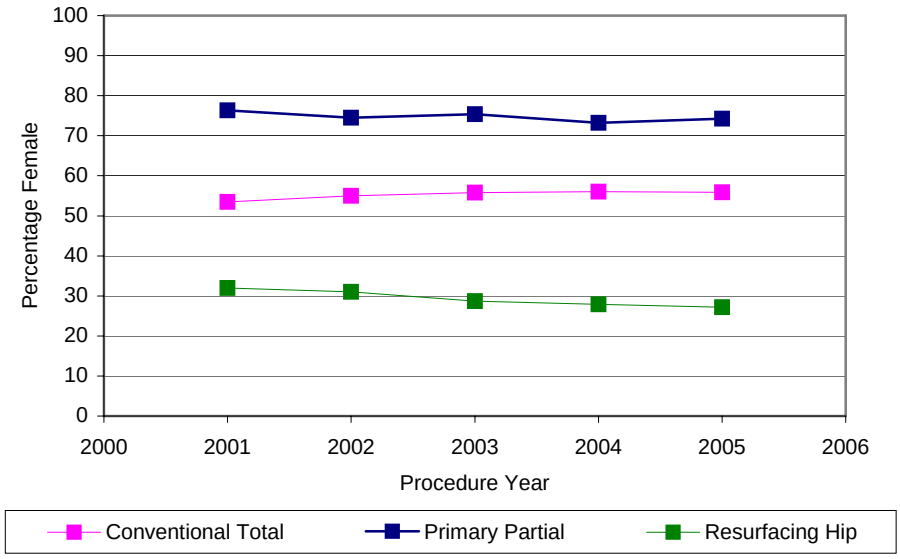


Table HG2: Summary statistics for All Hip Replacements by Age

Type of hip replacement	*<=54*		*55-64*		*65-74*		*75-84*		*>=85*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Unipolar Monoblock	33	0.3	151	1.2	1037	8.2	5257	41.7	6128	48.6	12606	57.0
Unipolar Modular	65	1.9	175	5.1	629	18.2	1539	44.5	1051	30.4	3459	15.7
Bipolar	161	2.7	398	6.6	1153	19.1	2725	45.2	1597	26.5	6034	27.3
Primary Partial	**259**	**1.2**	**724**	**3.3**	**2819**	**12.8**	**9521**	**43.1**	**8776**	**39.7**	**22099**	**100.0**
Conventional Total	10046	11.8	18831	22.2	29208	34.4	22765	26.8	4022	4.7	84872	92.0
Resurfacing	3684	51.1	2785	38.7	688	9.5	48	0.7	.	.	7205	7.8
Thrust Plate	55	41.4	54	40.6	22	16.5	2	1.5	.	.	133	0.1
Primary Total	**1378**	**14.9**	**2167**	**23.5**	**2991**	**32.4**	**2281**	**24.7**	**4022**	**4.4**	**92210**	**100.0**
Revision	**1706**	**10.2**	**2672**	**16.0**	**5049**	**30.3**	**5607**	**33.6**	**1638**	**9.8**	**16672**	**100.0**
Total	**15750**	**12.0**	**25066**	**19.1**	**37786**	**28.8**	**37943**	**29.0**	**14436**	**11.0**	**130981**	**100.0**

Type of hip replacement	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
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Total	**74619**	**57.0**	**56362**	**43.0**	**130981**	**100.0**

Figure HG2: Usage of different Type of Hip Replacement by Age (percentage < 65) and Year

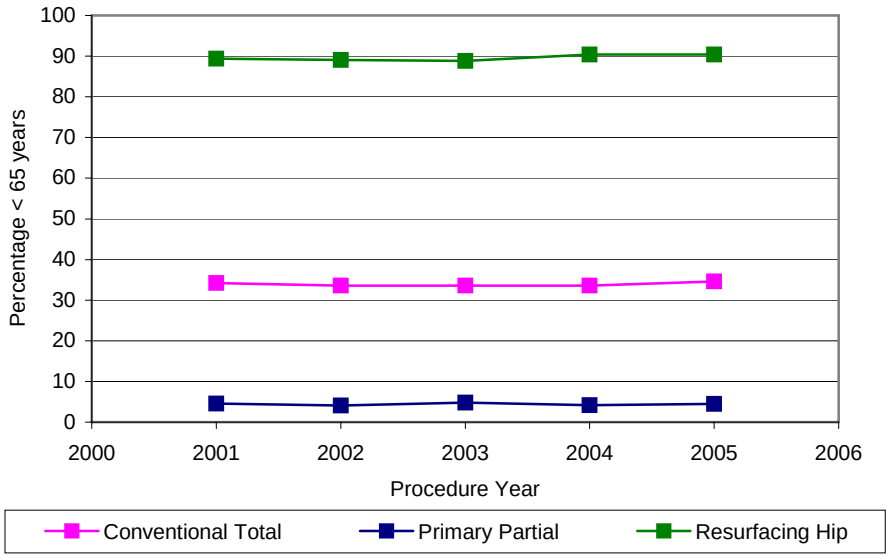


Figure HG3: Trends in Usage of Type of Hip Replacement by State and Territory

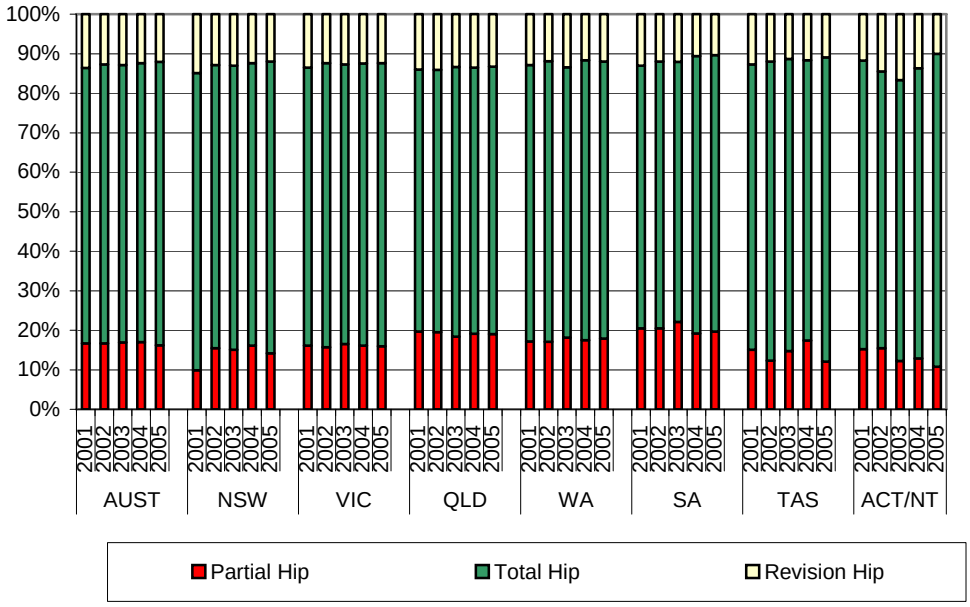


Table HG3: Time between procedures for Bilateral Primary Hips

1st Procedure	*2nd Procedure*	*Days between Bilateral Procedures*											
		Same Day		*<6 weeks*		*6 weeks - 6 months*		*6 months - 3 years*		*>=3 years*		***Total***	
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Bipolar	Bipolar	.	.	12	0.1	14	0.1	43	0.5	6	0.1	75	0.8
	Unipolar Mono	.	.	2	0.0	10	0.1	20	0.2	6	0.1	38	0.4
	Unipolar Modular	.	.	1	0.0	3	0.0	10	0.1	3	0.0	17	0.2
	Total Hip	1	0.0	1	0.0	8	0.1	18	0.2	5	0.1	33	0.3
Unipolar Mono	Bipolar	.	.	1	0.0	3	0.0	11	0.1	2	0.0	17	0.2
	Unipolar Mono	6	0.1	21	0.2	68	0.7	127	1.3	18	0.2	240	2.5
	Unipolar Modular	.	.	1	0.0	11	0.1	14	0.1	4	0.0	30	0.3
	Total Hip	.	.	.	.	5	0.1	5	0.1	2	0.0	12	0.1
Unipolar Modular	Bipolar	.	.	.	.	5	0.1	4	0.0	1	0.0	10	0.1
	Unipolar Mono	.	.	1	0.0	4	0.0	15	0.2	.	.	20	0.2
	Unipolar Modular	2	0.0	6	0.1	14	0.1	21	0.2	5	0.1	48	0.5
	Total Hip	.	.	.	.	4	0.0	8	0.1	.	.	12	0.1
Resurfacing	Resurfacing	159	1.7	28	0.3	174	1.8	366	3.9	46	0.5	773	8.2
	Total Hip	2	0.0	.	.	6	0.1	36	0.4	10	0.1	54	0.6
Thrust Plate	Thrust Plate	1	0.0	.	.	6	0.1	10	0.1	4	0.0	21	0.2
	Total Hip	.	.	.	.	.	.	1	0.0	1	0.0	2	0.0
Total Hip	Bipolar	1	0.0	2	0.0	7	0.1	26	0.3	7	0.1	43	0.5
	Unipolar Mono	.	.	1	0.0	3	0.0	12	0.1	7	0.1	23	0.2
	Unipolar Modular	.	.	.	.	3	0.0	9	0.1	3	0.0	15	0.2
	Thrust Plate	2	0.0	1	0.0	4	0.0	37	0.4	13	0.1	57	0.6
	Resurfacing	.	.	.	.	.	.	1	0.0	.	.	1	0.0
	Total Hip	371	3.9	154	1.6	2235	23.7	4494	47.6	651	6.9	7905	83.7
Total		**545**	**5.8**	**232**	**2.5**	**2587**	**27.4**	**5288**	**56.0**	**794**	**8.4**	**9446**	**100.0**

Table HG4: Revision Rates by type of Primary Hip Replacement

Type of hip replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Partial Hip Replacement	**624**	**22099**	**2.8**	**35898**	**1.7**	**(1.60, 1.88)**
Unipolar Monoblock	413	12606	3.3	19733	2.1	(1.90, 2.30)
Unipolar Modular	73	3459	2.1	5189	1.4	(1.10, 1.77)
Bipolar	138	6034	2.3	10976	1.3	(1.06, 1.49)
Conventional Total Hip	**1817**	**84872**	**2.1**	**195619**	**0.9**	**(0.89, 0.97)**
Cemented Total	238	12494	1.9	32928	0.7	(0.63, 0.82)
Cementless Total	978	42937	2.3	92605	1.1	(0.99, 1.12)
Hybrid	601	29441	2.0	70086	0.9	(0.79, 0.93)
Resurfacing Hip	**177**	**7205**	**2.5**	**15179**	**1.2**	**(1.00, 1.35)**
Thrust Plates	**4**	**133**	**3.0**	**381**	**1.0**	**(0.29, 2.69)**
Total	**2622**	**114309**	**2.3**	**247077**	**1.1**	**(1.02, 1.10)**

Table HG5: Yearly Cumulative percent revision of Type of Hip Replacement

Type of hip replacement	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Partial Hip	2.60 (2.37, 2.85)	3.65 (3.35, 3.97)	4.26 (3.91, 4.64)	
Unipolar Monoblock	3.12 (2.78, 3.49)	4.38 (3.95, 4.86)	5.18 (4.67, 5.75)	
Unipolar Modular	1.83 (1.38, 2.42)	2.91 (2.26, 3.75)	3.18 (2.45, 4.13)	
Bipolar	2.01 (1.66, 2.44)	2.67 (2.23, 3.19)	3.10 (2.58, 3.72)	
Conventional Total	1.53 (1.45, 1.62)	2.10 (1.99, 2.21)	2.55 (2.42, 2.67)	2.93 (2.78, 3.08)
Cemented Total	1.11 (0.93, 1.32)	1.64 (1.41, 1.90)	2.14 (1.87, 2.46)	2.53 (2.20, 2.90)
Cementless Total	1.71 (1.58, 1.84)	2.28 (2.13, 2.44)	2.79 (2.61, 2.98)	3.18 (2.96, 3.42)
Hybrid	1.45 (1.32, 1.60)	2.03 (1.86, 2.22)	2.38 (2.18, 2.59)	2.75 (2.51, 3.00)
Resurfacing Hip	1.98 (1.67, 2.35)	2.55 (2.17, 2.98)	3.12 (2.67, 3.64)	3.48 (2.94, 4.11)
Thrust Plates	1.53 (0.39, 5.99)	1.53 (0.39, 5.99)	2.67 (0.85, 8.21)	4.61 (1.61, 12.83)

Primary Partial Hip Replacement

This report is based on the analysis of 22,099 primary partial hip replacement procedures recorded by the Registry with a procedure date prior to the end of 2005. In this category of hip replacement there are 12,606 unipolar monoblock, 3,459 unipolar modular and 6,034 bipolar procedures.

Usage

Almost all primary partial hip prostheses are used for the management of fractures of the neck of femur (94.7%). The proportion of primary partial hip replacements compared to total and revision hip procedures has remained constant over the last five years. In 2005 primary partial hips accounted for 16.2% of all hip procedures (Table HG1).

There has however been a significant change in the use of the different categories of partial hip replacement. Unipolar monoblock prostheses are the most common group of partial hip replacements but their use has declined in recent years from 67.8% in 2001 to 47.9% in 2005. There has also been a marginal reduction in the use of bipolar prostheses, from a high of 30% in 2002 to 27% in 2005. Unipolar modular prostheses have increased from 10.3% in 2001 to 25.1% of all primary partial hips in 2005 (Figure HP1).

The proportional use of these different categories of partial hip replacement varies significantly between the different states and territories. All states and territories demonstrate reducing use of unipolar monoblock prostheses and for most this is associated with an increase in use of unipolar modular prostheses. Although the use of unipolar modular prostheses is increasing in most states bipolar prostheses remain the most common alternative to unipolar monoblock prostheses with the exception of South Australia and Tasmania where there is very little use of bipolar prostheses (Figure HP1).

Unipolar monoblock

There are three different prosthesis types in the unipolar monoblock category. They are the Austin Moore, Thompson and the Exeter Trauma System (ETS) prosthesis.

The decline in use of this category is due to a reduction in the use of the Austin Moore prosthesis. The absolute numbers of unipolar monoblock prostheses has declined by 14% in 2005 and the use of the Austin Moore has reduced by 22%. The Austin Moore however continues to remain the most used unipolar monoblock prosthesis (67.3%) but there has been increased proportional use of the Thompson (18.5% in 2002 to 27.5% in 2005). The Registry first reported the use of a small number of ETS prostheses in the 2005 annual report. This has increased to 5.2 % of unipolar monoblock prostheses in 2005 (Table HP1 and Figure HP2).

Unipolar modular

In 2005 14 different unipolar modular heads were used. They have been combined with different stems to give 70 different combinations of head and stem.

The Unitrax remains the most frequently used unipolar head and this is combined most commonly with the Exeter V40 stem (23.5% of all unipolar modular head/stem combinations). The five most common unipolar heads are used in 81.8% of all cases, the next five 15.8% and the last 4 were used in only 2.4% of cases (Table HP2 and Figure HP3).

Bipolar

As with previous years the UHR bipolar head was the most frequently used bipolar prosthesis in 2005 (47.4%). Sixteen different bipolar heads were used during 2005. As with unipolar modular heads, bipolar prostheses are combined with a large number of different femoral stems.

The most common combination during 2005 was the UHR and the Exeter V40 stem. This combination accounted for 36.1% of all combinations recorded by the

Registry. There are 157 different combinations of bipolar head and stem that have been used.

During 2005 the 5 most frequently used bipolar heads accounted for 81.3% of all cases, the next five 16.9% and the remaining 6 where used in 1.8% of cases (Table HP3 and Figure HP4).

Changes in use with Gender and Age

In the last five years there has been no change in the use of primary partial hips with respect to gender and age. There is a 3:1 ratio of use in women and 39.7% of individuals are 85 years or older. Only a small number of patients receiving these prostheses are less than 75 years old (17.2%) (Table HP4 and Table HP8).

Considering the individual categories of partial hip the 3:1 ratio of use in women is consistent across the categories and there has been no change in this pattern for monoblock, unipolar modular or bipolar prostheses in the last five years (Tables HP5-7)

With respect to age there is a difference in the use of the monoblock compared to the unipolar modular and the bipolar prostheses. The most common age group receiving the monoblock prostheses are 85 years or older (49.7% in 2005). The most common age group for unipolar modular and bipolar prostheses is the 75-84 year old age group (44.2% and 45.5% respectively in 2005). There has been no change in use of the different categories of partial hip replacement with respect to age in recent years (Tables HP9-11).

Fixation

Almost half of all primary partial hips are cemented (48.8%). When considering the different categories of primary partial hip, most unipolar monoblock prostheses are used without cement and most stems used with unipolar modular heads and bipolar prostheses are cemented (Table HP12).

Unipolar Monoblock
During the last three years the use of cemented fixation in the unipolar monoblock category has increased from 18% to 34.6% (Figure HP5). This change is related to decreasing use of Austin Moore prostheses and increased use of the Thompson and ETS. A small number of Austin Moore prostheses have been cemented and a similar number of Thompson prostheses have been used without cement. Cement fixation has been used for all ETS procedures (Table HP28).

The evident state and territory variation in the use of cement with this category of primary partial hip replacement is a reflection of the regional variation in the use of the Austin Moore and Thompson prostheses.

Unipolar Modular
The increasing trend to cementless fixation of stems used with unipolar modular heads noted in previous reports has now reversed. Cemented fixation has increased from 70.1% in 2004 to 75.7% in 2005 (Figure HP6). There is significant state and territory variation with very little use of cementless fixation in ACT/NT, WA and QLD to a very high use in Tasmania. All state and territories except for NSW, QLD and WA have increased the proportion of procedures using cement fixation during 2005 (Figure HP6).

Bipolar
Almost 80% of stems used with bipolar prostheses are cemented. A number of states have increased the use of cementless fixation in 2005. In particular South Australia has increased from 25% cementless in 2004 to 56.3% in 2005 and Tasmania has gone from largely cemented stems in 2004 to 50% cementless in 2005 (Figure HP7).

Outcomes of Primary Partial Hip Replacements

Of the 22,099 primary partial hips analysed by the Registry for this report 624 (2.8%) have been revised and there have been 1.7 revisions per 100 observed component years. At one year the cumulative percentage revision is 2.6% and at 3 years it is 4.26%. There are significant differences in the rate of revision depending on category of primary partial hip replacement as well as age, gender,

method of fixation and the type of prosthesis.

Outcomes of Partial Hip replacement

Outcome analysis has been undertaken for a variety of different factors. For these analyses only procedures with a primary diagnosis of fractured neck of femur are included and revisions for infection are excluded.

Age and Gender

Age has a significant effect on the outcome of partial hip replacements. In general the older the patient the less likely they are to be revised with the exception of bipolar prostheses. In the 85 year and over age group bipolar prostheses do not show a decline in the number of revisions that is evident in unipolar monoblock and unipolar modular prostheses. Monoblock prostheses have a higher rate of revision at any age compared to both unipolar modular and bipolar prostheses. Bipolar prostheses are revised less often than unipolar modular prostheses in the under 75's and the 75-84 year age group.

In all categories of partial hip replacement males are revised more frequently than females. There is however only a significant gender difference in the bipolar group.

Unipolar Monoblock
The risk of revision decreases with increasing age. At three years the cumulative percentage revision for patients under the age of 75 years is 9.16%, 75-84 years, 5.27% and 85 years and over it is 3.07% (Table HP13, Table HP14 and Figure HP8). This relationship of decreasing revision rate with increasing age is evident in both males and females with males having a higher rate of revision in each age group except in the less than 75 year old age group (Table HP19).

Unipolar Modular
A similar trend is evident in unipolar modular prostheses however the risk of revision is half that of the unipolar monoblock at any age. At three years the cumulative percent revised for patients under the age of 75 years it is 4.77%, 75-84 years, 2.44% and 85 years and over 1.13% (Table HP15, Table HP16 and Figure HP9). The higher rate of revision in males is also evident except in the 85 year and over age group (Table HP20).

Bipolar
Unlike monoblock and unipolar modular prostheses, there is no obvious decrease in revisions in the 85 years and over age group. At three years the cumulative percentage revision for patients under the age of 75 years is 3.49%, 75-84 years, 1.88% and 85 years and over it is 2.57% (Table HP17, Table HP18 and Figure HP10).

The observed increase in the 85 years and older compared to the 75-84 year old age group is evident for both male and females (Table HP21).

Fixation

Fixation has a significant impact on the outcome in all categories of partial hip replacement. The use of cement reduces the revision rate by over half for both unipolar monoblock and unipolar modular prostheses. The difference due to fixation of the stem when a bipolar prostheses is used is not as great but cemented still has significantly less revisions.

Unipolar Monoblock
The Registry has previously reported the significant difference in outcome of the various unipolar monoblock prostheses and that this is related to the use of cement. Analysis of the most recent data further supports the finding that cement fixation is associated with significantly less revision.

Although an analysis of all monoblock prostheses on the basis of cement fixation is similar to an analysis comparing the outcome of Austin Moore to Thompson prostheses it is not entirely the same. This is because a proportion of Austin Moore prostheses are cemented and a similar number of Thompson prostheses are not. In addition this analysis includes the ETS, which is cemented.

At three years cumulative percentage revision of cementless unipolar monoblock

prostheses is 5.64% and for cemented unipolar monoblock prostheses this is 1.66% (hazard ratio (adjusted for age and sex) cementless v cemented unipolar monoblock = 2.567; 95% CI (1.842,3.578) P<0.0001 (Table HP22, Table HP23 and Figure HP11).

Unipolar Modular
Cementless unipolar modular prostheses have greater than twice the number of revisions compared to cemented unipolar modular prostheses (hazard ratio (adjusted for age and sex) cementless v cemented unipolar modular = 2.649; 95% CI (1.513,4.460) P=0.0007 (Table HP24, Table HP25 and Figure HP12).

The cumulative percentage revision at two years for cemented unipolar modular prostheses is 2.01% and for cementless is 3.98% (Table HP25).

Bipolar
Bipolar prostheses with cementless stems have a significantly higher rate of revision when compared to bipolar prostheses with cemented stems (hazard ratio (adjusted for age and sex) cementless v cemented bipolar = 1.814; 95% CI (1.142,2.880) P=0.0116 (Table HP26, Table HP27 and Figure HP13).

The cumulative percentage revision at three years for bipolar prostheses with cemented stems is 2.34% and with cementless stems is 3.42% (Table HP27).

Outcome of Specific Types of Prostheses

Unipolar Monoblock
Austin Moore and Thompson prostheses are manufactured by a variety of different companies however the Registry has not undertaken a manufacturer specific outcome analysis for these two types of prostheses. Apart from the ETS there are no other specific prostheses types within the unipolar monoblock category.

The use of cement has a major impact on the revision rate of Austin Moore and Thompson prostheses. The proportion of Austin Moore prostheses when used in the intended manner without cement that have been revised is twice the proportion of revisions for cemented Austin Moore and cemented Thompson prostheses. When Thompson prostheses are used without cement, the proportion revised and the revisions per 100 observed component years is similar to cementless Austin Moore prostheses (Table HP28).

The cumulative revision rate of cementless Austin Moore at one year is 3.66% and at three years is 6.06%. This is significantly greater than the cemented Thompson prosthesis that has a cumulative revision rate of 1.35% at one year and 2.29% at three years (hazard ratio adjusted for age and sex cementless Austin Moore v cemented Thompson = 2.190; 95%CI (1.611,2.978) P<0.0001) (Table HP28 and Table HP29 and Figure HP14).

It can be observed from the cumulative percentage revision curve that after three years there has been an increase in the revision of cemented Thompson prostheses (Figure HP14). This increase is related to eight revisions of the small number of individuals that are still at risk of revision at three years with this prosthesis. In four of these patients the revisions were for problems related to pelvic migration of the head of the prosthesis.

There have only been a small number of ETS procedures (156) many of which have been followed for less than 12 months since the time of surgery. At this very early stage the proportion of revisions and revisions per one hundred observed component years is at least equivalent to the cemented Thompson prosthesis (Table HP28).

Unipolar Modular
The revision rate is variable for specific unipolar heads depending on which stem they are combined with. The revision rates for stem/head combinations with greater than 50 procedures recorded by the Registry are presented in Table HP30. the cumulative percentage revision for these combinations are presented in Table HP31.

These prostheses were analysed using the Registry algorithm to identify prosthesis and prostheses combinations with a higher

than anticipated revision rate. The Taperloc stem and Endo II head was identified by this process. As the numbers are so small it would not normally be identified as part of this report (3 revisions out of 44 procedures. The Taperloc stem however was also identified as having a higher than anticipated number of revisions when used in combination with a bipolar head (3 revisions from a further of 29 procedures). The Registry has recorded 89 Taperloc stems being used in unipolar modular and bipolar procedures 6 (6.7%) of which have been revised.

Bipolar

As with unipolar modular heads, bipolar prostheses show variable revision rates depending on the stem they are combined with. This is evident from examination of the different rates of revision for the UHR bipolar prosthesis and its various stem combinations (Table HP32 and Table HP33).

Apart from the Taperloc stem when it is used with either unipolar modular or bipolar heads, the Registry has also identified a bipolar prosthesis and a bipolar/stem combination that have a higher than anticipated revision rate.

The bipolar prosthesis is the Biomet bipolar. The Registry has recorded only a small number of these procedures but 7.5% have been revised compared to 2.2% for all other bipolar prostheses combined. There have been 4.5 revisions per 100 observed component years and this compares to 1.2 for the other bipolar prostheses combined (Table HP34). All of the revisions occurred within the first 12 months. The cumulative percentage revision at 12 months was 7.98% and for all other bipolar prostheses combined this was 1.93% (data not shown). There is a statistically significant difference compared to other bipolar prostheses (hazard ratio (adjusted for age and sex) Biomet bipolar v all other bipolar = 3.55; 95%CI (0.9,8.0) P=0.008).

The Omnifit/UHR combination is a combination that the Registry has reported previously as having a higher than anticipated rate of revision. At three years this has a cumulative percentage revision of 5.35% compared 2.99% for other bipolar prostheses (Table HP35 and HP36 and Figure HP15) (hazard ratio (adjusted for age and sex) Omnifit/UHR bipolar v all other bipolar = 2.28; 95%CI (1.33,3.91) P=0.0027) (Table HP30 and Table HP31).

Primary Partial Hip Replacement - 1/9/1999 to 31/12/2005

Prosthesis Usage

Figure HP1: Trends in Usage of Primary Partial Hip Replacement by State and Territory

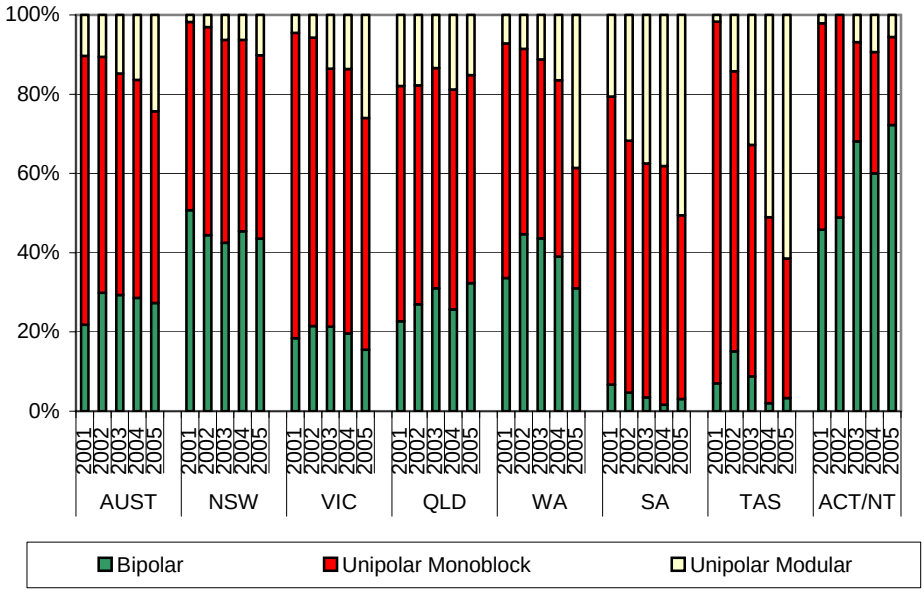


Table HP1: Unipolar Monoblock Prostheses used in Primary Partial Hips

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Austin-Moore Type (1514)	Austin-Moore Type (1977)	Austin-Moore Type (1984)	Austin-Moore Type (1939)	Austin-Moore Type (1510)
2	Thompson Type (417)	Thompson Type (450)	Thompson Type (521)	Thompson Type (627)	Thompson Type (616)
3				ETS (40)	ETS (116)
% using 10 most common	100%	100%	100%	100%	100%
Total N Procedures	1931	2427	2505	2606	2242
Total N Prosthesis Types	2	2	2	3	3

Figure HP2: 5 Most common Unipolar Monoblock Prostheses used in Primary Partial Hips

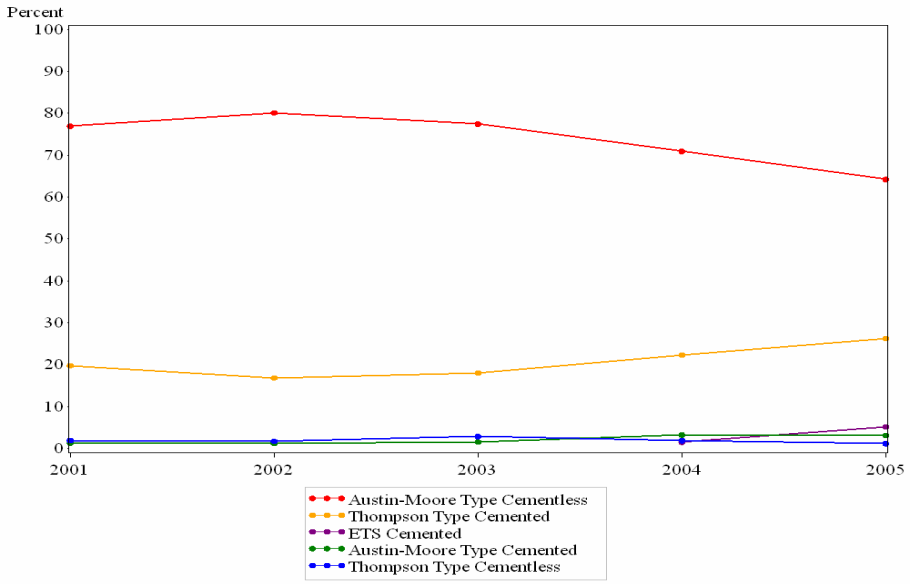


Table HP2: 10 Most common Unipolar Modular Heads used in Primary Partial Hips

Rank	2001	2002	2003	2004	2005
1	Unitrax (64)	Unitrax (118)	Unitrax (193)	Unitrax (195)	Unitrax (316)
2	Hemi (Mathys) (58)	Hemi (Mathys) (79)	Unipolar (Sulzer) (113)	Unipolar (S&N) (146)	Unipolar (S&N) (242)
3	Unipolar (Zimmer) (49)	Unipolar (S&N) (59)	Unipolar (S&N) (89)	Hemi (Mathys) (110)	VerSys Endo (148)
4	Unipolar (S&N) (43)	Unipolar (Sulzer) (55)	VerSys Endo (75)	Unipolar (Sulzer) (101)	Hemi (Mathys) (113)
5	Ultima (41)	Unipolar (Zimmer) (47)	Hemi (Mathys) (63)	VerSys Endo (87)	Unipolar (Zimmer) (100)
6	Unipolar (Sulzer) (20)	Hemi (Depuy) (32)	Hemi (Depuy) (46)	Unipolar (Endoprothetik) (65)	Unipolar (Endoprothetik) (68)
7	Hemi (Depuy) (12)	Ultima (24)	Unipolar (Endoprothetik) (38)	Endo II (22)	Endo II (42)
8	Modular Endo (3)	Unipolar (Sulzer) (6)	Unipolar (Zimmer) (28)	Modular Endo (13)	Unipolar (Corin) (28)
9	VerSys Endo (2)	Lubinus SP II (5)	Ultima (16)	Hemi (Depuy) (12)	Modular Cathcart (20)
10		VerSys Endo (3)	Unipolar (Sulzer) (1)	Unipolar (Zimmer) (12)	Unipolar (Sulzer) (20)
% using 10 most common	100%	99.1%	100%	98.1%	97.6%
Total N Procedures	292	432	662	778	1124
Total N Prosthesis Types	9	12	10	14	14

Figure HP3: 5 Most common Unipolar Modular Heads used in Primary Partial Hips

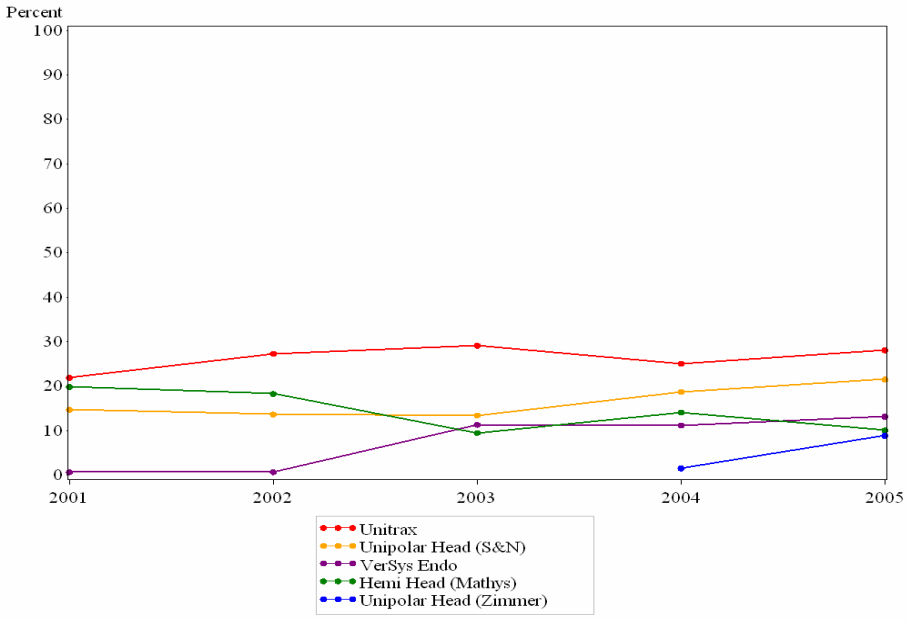


Table HP3: 10 Most common Bipolar Heads used in Primary Partial Hips

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	UHR (215)	UHR (689)	UHR (736)	UHR (642)	UHR (600)
2	Centrax (172)	Hastings (133)	Hastings (140)	Convene (191)	Tandem (126)
3	Hastings (119)	Endo (Depuy) (106)	Convene (114)	Hastings (138)	Convene (107)
4	Convene (61)	Convene (96)	Bipolar (Sulzer) (91)	Endo (Depuy) (113)	Multipolar Bi (99)
5	Bipolar (Zimmer) (18)	Bipolar (Sulzer) (68)	Endo (Depuy) (82)	Bipolar (Sulzer) (99)	Hastings (96)
6	Bipolar (Sulzer) (11)	Bipolar (Zimmer) (43)	Multipolar Bi (58)	Multipolar Bi (90)	Endo (Depuy) (87)
7	Bipolar (Biomet) (6)	Bipolar (Mathys) (29)	Bipolar (Mathys) (39)	Bipolar (Mathys) (21)	Bipolar (Sulzer) (77)
8	Endo (Depuy) (6)	Bipolar (Biomet) (16)	Bipolar (Lima) (19)	Bipolar (Biomet) (20)	Bipolar (Mathys) (24)
9	Bipolar (Mathys) (5)	Centrax (10)	Bipolar (Biomet) (19)	UHL (11)	Bipolar (Biomet) (15)
10	Bipolar Head (2)	Bipolar (Lima) (8)	Self-Centering (5)	Bipolar (Lima) (10)	Bipolar (Zimmer) (11)
% using 10 most common	99%	98.1%	99.2%	98.4%	98.2%
Total N Procedures	621	1221	1314	1357	1265
Total N Prosthesis Types	14	16	13	17	16

Figure HP4: 5 Most common Bipolar Heads used in Primary Partial Hips

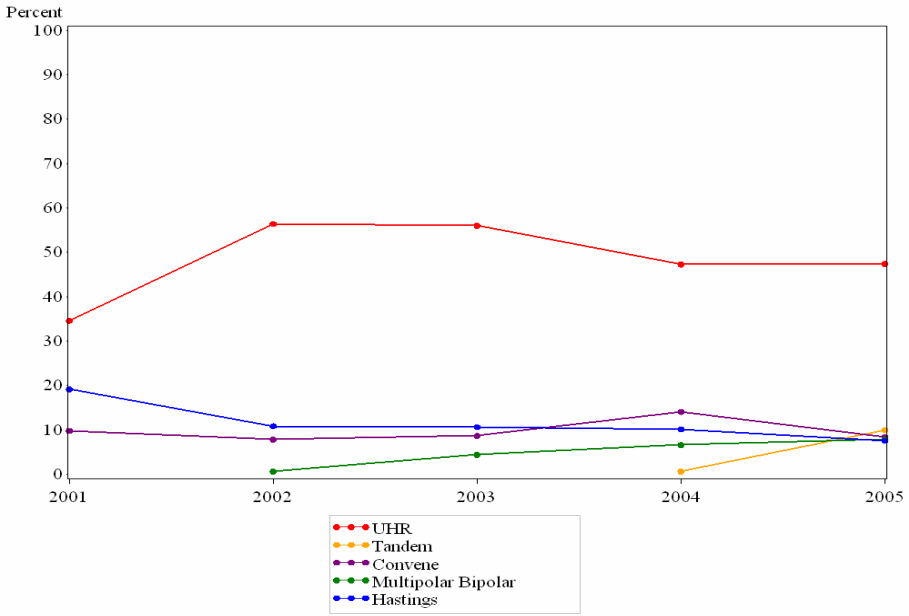


Table HP4: Usage of Partial Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	2169	76.3	675	23.7	2844	100.0
2002	3040	74.5	1040	25.5	4080	100.0
2003	3380	75.4	1101	24.6	4481	100.0
2004	3472	73.2	1269	26.8	4741	100.0
2005	3442	74.3	1189	25.7	4631	100.0

Table HP5: Usage of Unipolar Monoblock Partial Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	1470	76.1	461	23.9	1931	100.0
2002	1829	75.4	598	24.6	2427	100.0
2003	1898	75.8	607	24.2	2505	100.0
2004	1908	73.2	698	26.8	2606	100.0
2005	1680	74.9	562	25.1	2242	100.0

Table HP6: Usage of Unipolar Modular Partial Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	217	74.3	75	25.7	292	100.0
2002	313	72.5	119	27.5	432	100.0
2003	503	76.0	159	24.0	662	100.0
2004	582	74.8	196	25.2	778	100.0
2005	843	75.0	281	25.0	1124	100.0

Table HP7: Usage of Bipolar Partial Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	482	77.6	139	22.4	621	100.0
2002	898	73.5	323	26.5	1221	100.0
2003	979	74.5	335	25.5	1314	100.0
2004	982	72.4	375	27.6	1357	100.0
2005	919	72.6	346	27.4	1265	100.0

Table HP8: Usage of Partial Hip Replacement by Age

Year	0-54		55-64		65-74		75-84		85+		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2001	31	1.1	100	3.5	373	13.1	1231	43.3	1109	39.0	2844	100.0
2002	48	1.2	120	2.9	529	13.0	1819	44.6	1564	38.3	4080	100.0
2003	57	1.3	159	3.5	546	12.2	1892	42.2	1827	40.8	4481	100.0
2004	49	1.0	149	3.1	608	12.8	2024	42.7	1911	40.3	4741	100.0
2005	54	1.2	154	3.3	588	12.7	1997	43.1	1838	39.7	4631	100.0

Table HP9: Usage of Unipolar Monoblock Partial Hip Replacement by Age

Year	0-54		55-64		65-74		75-84		85+		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2001	5	0.3	24	1.2	197	10.2	816	42.3	889	46.0	1931	100.0
2002	6	0.2	29	1.2	187	7.7	1068	44.0	1137	46.8	2427	100.0
2003	7	0.3	35	1.4	187	7.5	1001	40.0	1275	50.9	2505	100.0
2004	6	0.2	23	0.9	212	8.1	1085	41.6	1280	49.1	2606	100.0
2005	7	0.3	26	1.2	174	7.8	921	41.1	1114	49.7	2242	100.0

Table HP10: Usage of Unipolar Modular Partial Hip Replacement by Age

Year	0-54		55-64		65-74		75-84		85+		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2001	6	2.1	14	4.8	58	19.9	129	44.2	85	29.1	292	100.0
2002	11	2.5	21	4.9	78	18.1	191	44.2	131	30.3	432	100.0
2003	10	1.5	30	4.5	107	16.2	304	45.9	211	31.9	662	100.0
2004	14	1.8	44	5.7	139	17.9	340	43.7	241	31.0	778	100.0
2005	6	2.1	14	4.8	58	19.9	129	44.2	85	29.1	292	100.0

Table HP11: Usage of Bipolar Partial Hip Replacement by Age

Year	0-54		55-64		65-74		75-84		85+		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2001	20	3.2	62	10.0	118	19.0	286	46.1	135	21.7	621	100.0
2002	31	2.5	70	5.7	264	21.6	560	45.9	296	24.2	1221	100.0
2003	40	3.0	94	7.2	252	19.2	587	44.7	341	26.0	1314	100.0
2004	29	2.1	82	6.0	257	18.9	599	44.1	390	28.7	1357	100.0
2005	30	2.4	69	5.5	200	15.8	575	45.5	391	30.9	1265	100.0

Table HP12: Prosthesis fixation - Partial Hip Replacement

Fixation	*Unipolar Monoblock*		*Unipolar Modular*		*Bipolar*		*All Patients*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Cemented	3038	13.7	2692	12.2	5044	22.8	10774	48.8
Cementless	9568	43.3	767	3.5	990	4.5	11325	51.2
Total	**12606**	**57.0**	**3459**	**15.7**	**6034**	**27.3**	**22099**	**100.0**

Figure HP5: Trends in Prosthesis Fixation - Unipolar Monoblock by State and Territory

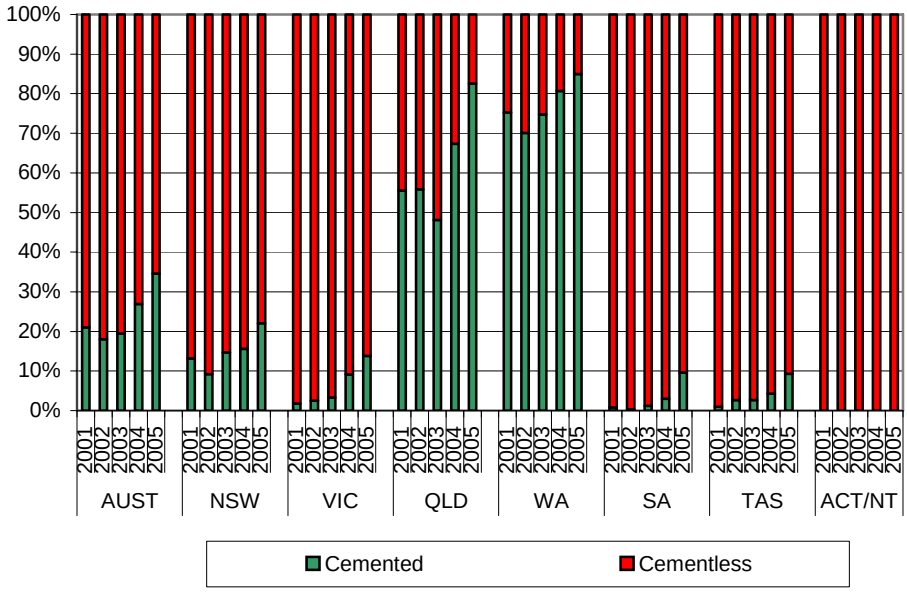


Figure HP6: Trends in Prosthesis Fixation - Femoral components used with Unipolar Modular prostheses by State and Territory

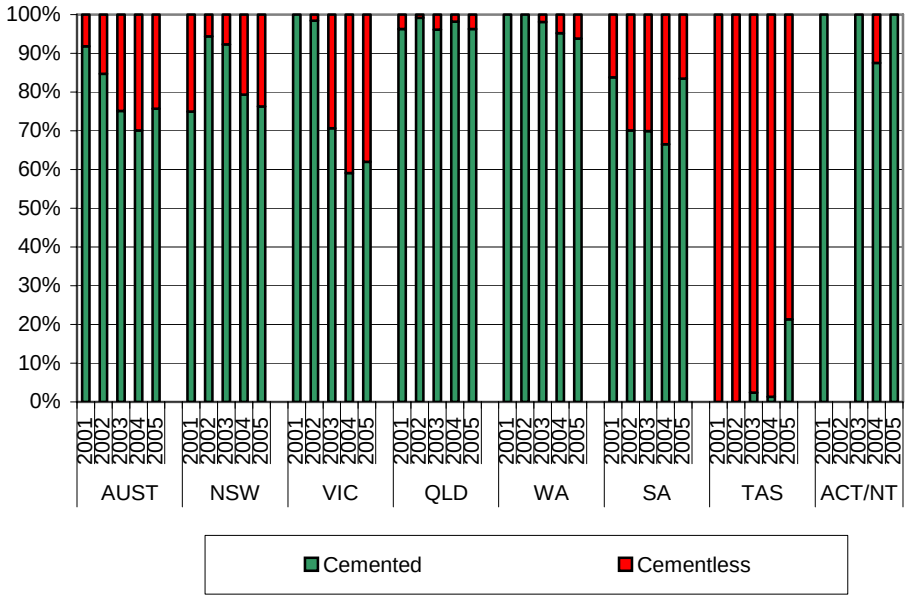


Figure HP7: Trends in Prosthesis Fixation - Femoral components used with Bipolar prostheses by State and Territory

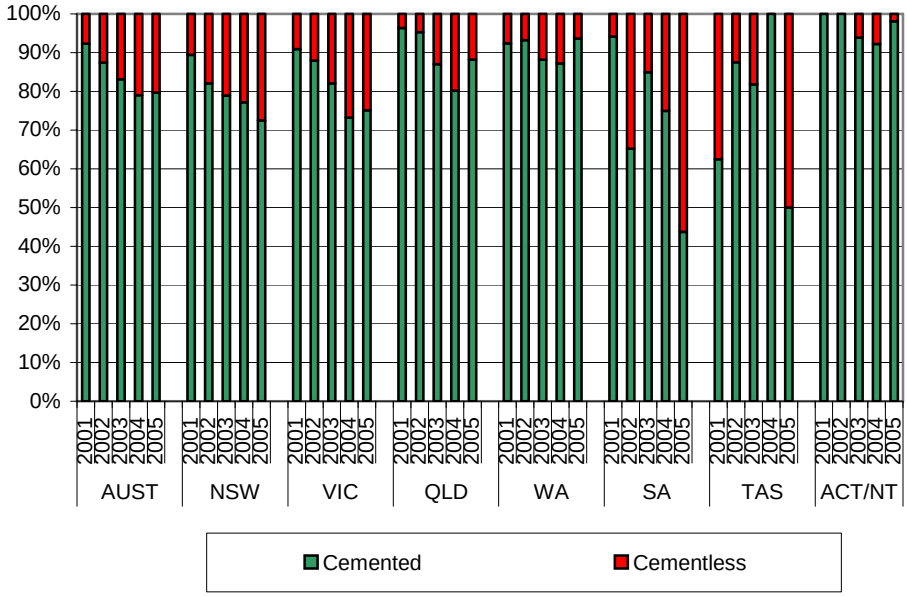
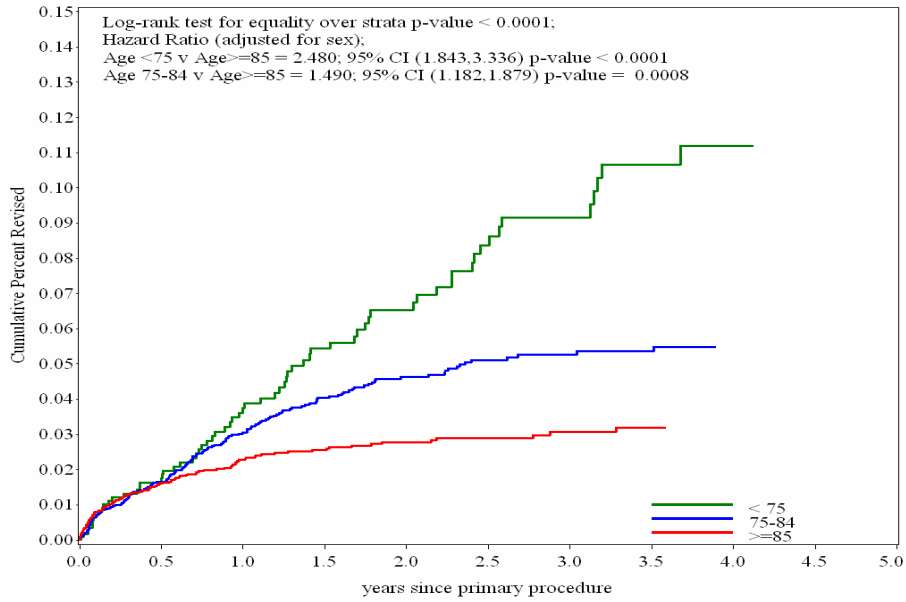


Table HP13: Primary Unipolar Monoblock Hip Procedures Requiring Revision by Age (primary diagnosis Fractured NOF excluding infection)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Age < 75	69	1173	5.9	2101	3.3	(2.55, 4.16)
Age 75-84	173	5119	3.4	8546	2.0	(1.73, 2.35)
Age >= 85	122	5995	2.0	8612	1.4	(1.18, 1.69)
Total	**364**	**12287**	**3.0**	**19259**	**1.9**	**(1.70, 2.09)**

Figure HP8: Cumulative percentage revision of Primary Unipolar Monoblock Hip Procedures by Age (primary diagnosis Fractured NOF excluding infection)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Age <75	1173	876	706	561	452	357	272	195	129	75	35
Age 75-84	5119	3704	2938	2319	1822	1379	1053	721	467	253	113
Age >=85	5995	3814	3016	2367	1797	1337	949	660	390	209	92

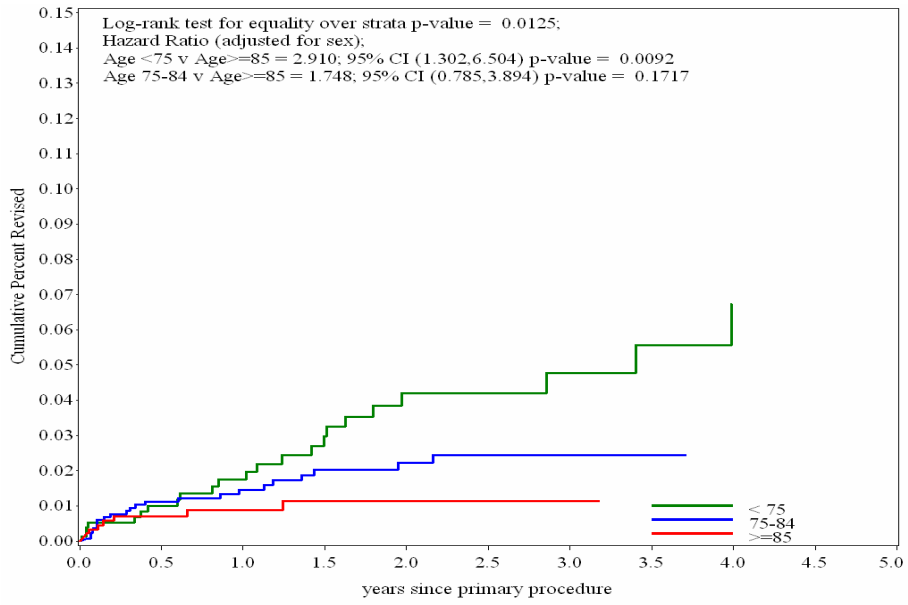
Table HP14: Yearly cumulative percentage revision of Primary Unipolar Monoblock Hip Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Age <75	3.75 (2.68, 5.23)	6.53 (4.96, 8.57)	9.16 (7.10, 11.78)
Age 75-84	3.05 (2.56, 3.65)	4.63 (3.96, 5.41)	5.27 (4.51, 6.15)
Age >=85	2.27 (1.87, 2.76)	2.78 (2.30, 3.35)	3.07 (2.53, 3.73)

Table HP15: Primary Unipolar Modular Hip Procedures Requiring Revision by Age (primary diagnosis Fractured NOF excluding infection)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Age < 75	24	786	3.1	1336	1.8	(1.15, 2.67)
Age 75-84	24	1425	1.7	2273	1.1	(0.68, 1.57)
Age >= 85	8	979	0.8	1267	0.6	(0.27, 1.24)
Total.	**56**	**3190**	**1.8**	**4876**	**1.1**	**(0.87, 1.49)**

Figure HP9: Cumulative percentage revision of Primary Unipolar Modular Hip Procedures by Age (primary diagnosis Fractured NOF excluding infection)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Age <75	786	590	456	355	271	203	157	116	78	49	28
Age 75-84	1425	1021	798	630	478	333	241	163	118	68	27
Age >=85	979	610	481	345	259	169	113	72	43	22	8

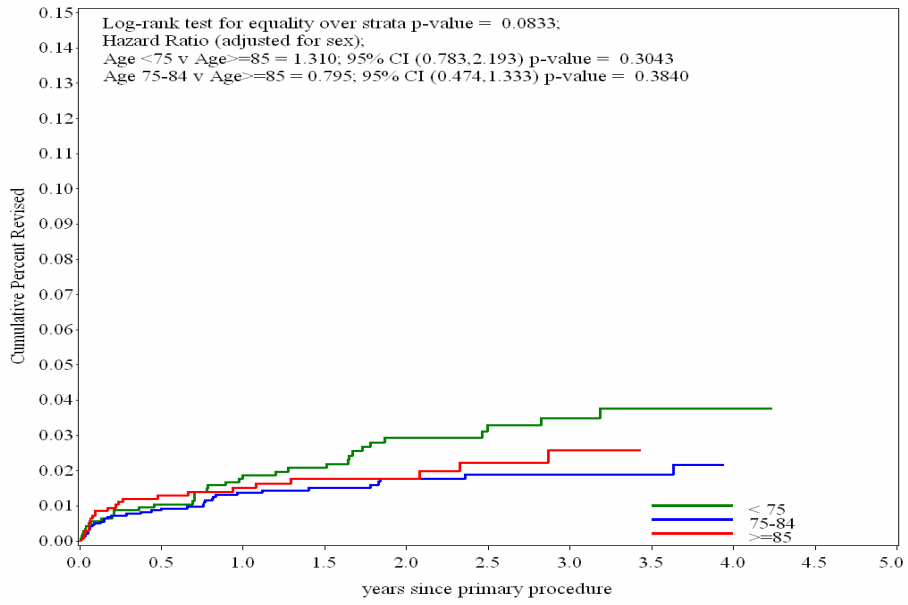
Table HP16: Yearly cumulative percentage revision of Primary Unipolar Modular Hip Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Age <75	1.75 (0.96, 3.16)	4.20 (2.67, 6.57)	4.77 (3.01, 7.53)
Age 75-84	1.46 (0.90, 2.35)	2.22 (1.43, 3.42)	2.44 (1.58, 3.76)
Age >=85	0.89 (0.42, 1.87)	1.13 (0.55, 2.32)	1.13 (0.55, 2.32)

Table HP17: Primary Bipolar Hip Procedures Requiring Revision by Age (primary diagnosis Fractured NOF excluding infection)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Age < 75	37	1427	2.6	3010	1.2	(0.87, 1.69)
Age 75-84	36	2477	1.5	4695	0.8	(0.54, 1.06)
Age >= 85	24	1481	1.6	2258	1.1	(0.68, 1.58)
Total.	**97**	**5385**	**1.8**	**9963**	**1.0**	**(0.79, 1.19)**

Figure HP10: Cumulative percentage revision of Primary Bipolar Hip Procedures by Age (primary diagnosis Fractured NOF excluding infection)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Age <75	1427	1158	1018	868	690	544	417	285	182	95	52
Age 75-84	2477	1941	1632	1314	1061	826	610	404	230	127	66
Age >=85	1481	1045	820	643	487	356	239	126	62	33	16

Table HP18: Yearly cumulative percentage revision of Primary Bipolar Hip Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Age <75	1.87 (1.24, 2.81)	2.93 (2.07, 4.16)	3.49 (2.48, 4.92)
Age 75-84	1.38 (0.96, 1.98)	1.77 (1.25, 2.49)	1.88 (1.33, 2.64)
Age >=85	1.51 (0.96, 2.36)	1.77 (1.14, 2.73)	2.57 (1.61, 4.11)

Table HP19: Primary Unipolar Monoblock Hip Procedures Requiring Revision by Sex and Age (primary diagnosis Fractured NOF excluding infection)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <75	53	786	6.7	1540	3.4	(2.58, 4.50)
Female 75-84	133	3812	3.5	6924	1.9	(1.61, 2.28)
Female >=85	96	4618	2.1	7226	1.3	(1.08, 1.62)
Males by Age						
Male <75	16	387	4.1	562	2.8	(1.63, 4.63)
Male 75-84	40	1307	3.1	1622	2.5	(1.76, 3.36)
Male >=85	26	1377	1.9	1386	1.9	(1.23, 2.75)
Total	**364**	**12287**	**3.0**	**19259**	**1.9**	**(1.70, 2.09)**

Table HP20: Primary Unipolar Modular Hip Procedures Requiring Revision by Sex and Age (primary diagnosis Fractured NOF excluding infection)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <75	15	562	2.7	1001	1.5	(0.84, 2.47)
Female 75-84	15	1084	1.4	1802	0.8	(0.47, 1.37)
Female >=85	7	750	0.9	1029	0.7	(0.27, 1.40)
Males by Age						
Male <75	9	224	4.0	335	2.7	(1.23, 5.10)
Male 75-84	9	341	2.6	471	1.9	(0.87, 3.63)
Male >=85	1	229	0.4	238	0.4	(0.01, 2.34)
Total	**56**	**3190**	**1.8**	**4876**	**1.1**	**(0.87, 1.49)**

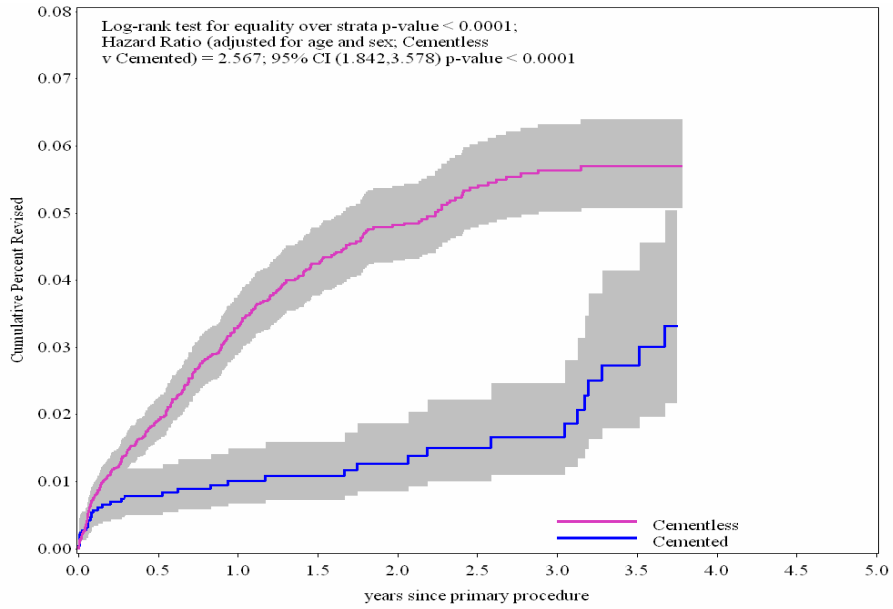
Table HP21: Primary Bipolar Hip Procedures Requiring Revision by Sex and Age (primary diagnosis Fractured NOF excluding infection)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <75	24	1031	2.3	2276	1.1	(0.68, 1.57)
Female 75-84	22	1877	1.2	3665	0.6	(0.38, 0.91)
Female >=85	17	1081	1.6	1788	1.0	(0.55, 1.52)
Males by Age						
Male <75	13	396	3.3	735	1.8	(0.94, 3.03)
Male 75-84	14	600	2.3	1030	1.4	(0.74, 2.28)
Male >=85	7	400	1.8	470	1.5	(0.60, 3.07)
Total	**97**	**5385**	**1.8**	**9963**	**1.0**	**(0.79, 1.19)**

Table HP22: Primary Unipolar Monoblock Procedures Requiring Revision by Femoral Cement (primary diagnosis Fractured NOF excluding infection)

Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	39	2955	1.3	4443	0.9	(0.62, 1.20)
Cementless	325	9332	3.5	14816	2.2	(1.96, 2.45)
Total	**364**	**12287**	**3.0**	**19259**	**1.9**	**(1.70, 2.09)**

Figure HP11: Cumulative percentage revision of Primary Unipolar Monoblock Hip Procedures by femoral cement (primary diagnosis Fractured NOF excluding infection)



Fixation	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Cemented	2955	1999	1557	1168	895	670	505	356	234	139	70
Cementless	9332	6395	5103	4079	3176	2403	1769	1220	752	398	170

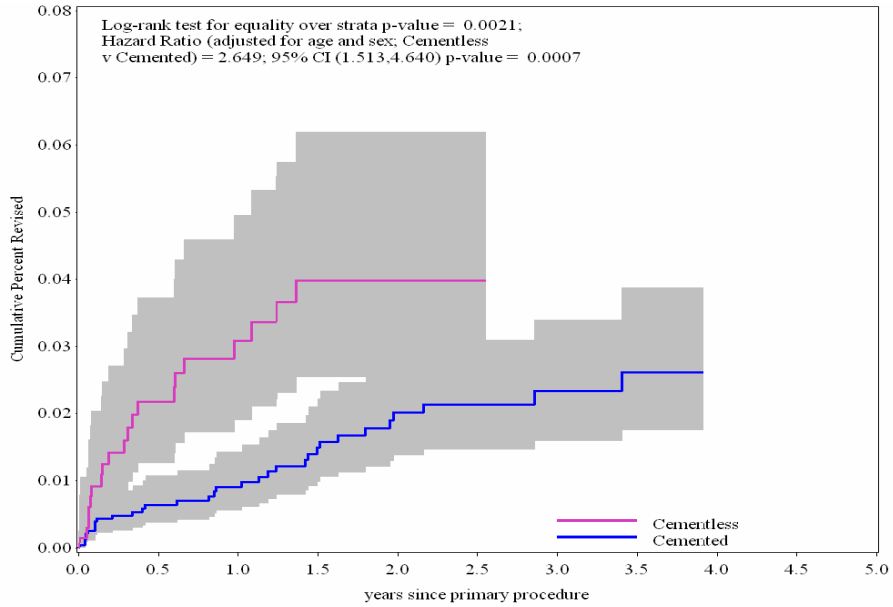
Table HP23: Yearly cumulative percentage revision of Primary Unipolar Monoblock Hip Procedures by femoral cement

Fixation	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Cemented	1.01 (0.68, 1.50)	1.27 (0.86, 1.88)	1.66 (1.11, 2.48)
Cementless	3.32 (2.92, 3.77)	4.82 (4.30, 5.40)	5.64 (5.03, 6.32)

Table HP24: Primary Unipolar Modular Procedures Requiring Revision by Femoral Cement (primary diagnosis Fractured NOF excluding infection)

Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	36	2469	1.5	4005	0.9	(0.63, 1.24)
Cementless	20	721	2.8	871	2.3	(1.40, 3.55)
Total	**56**	**3190**	**1.8**	**4876**	**1.1**	**(0.87, 1.49)**

Figure HP12: Cumulative percentage revision of Primary Unipolar Modular Hip Procedures by Femoral Cement (primary diagnosis Fractured NOF excluding infection)



Fixation	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Cemented	2469	1743	1365	1069	846	622	467	326	228	137	62
Cementless	721	478	370	261	162	83	44	25	11	2	1

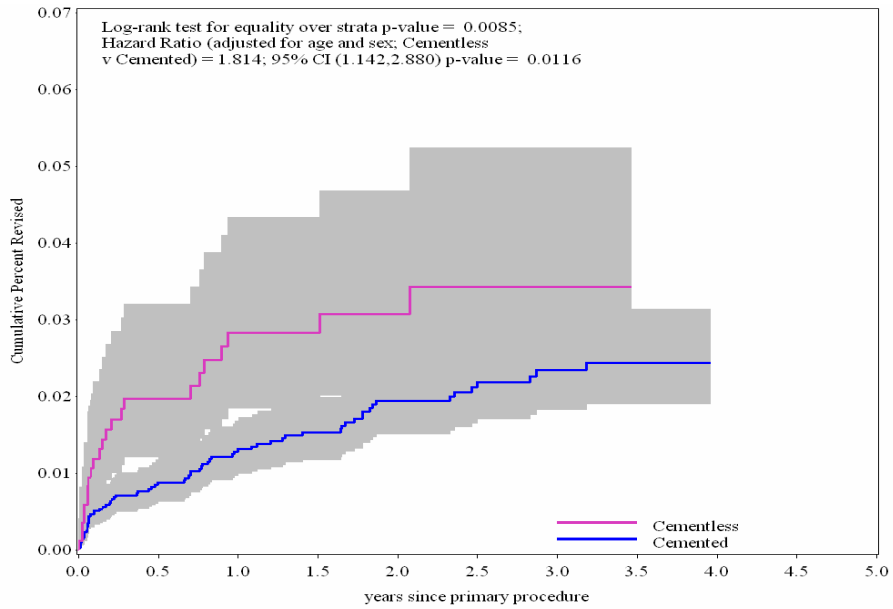
Table HP25: Yearly cumulative percentage revision of Primary Unipolar Modular Hip Procedures by Femoral Cement

Fixation	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Cemented	0.90 (0.57, 1.44)	2.01 (1.38, 2.92)	2.33 (1.60, 3.40)
Cementless	3.08 (1.91, 4.95)	3.98 (2.55, 6.20)	

Table HP26: Primary Bipolar Procedures Requiring Revision by Femoral Cement (primary diagnosis Fractured NOF excluding infection)

Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	73	4512	1.6	8573	0.9	(0.67, 1.07)
Cementless	24	873	2.7	1390	1.7	(1.11, 2.57)
Total	**97**	**5385**	**1.8**	**9963**	**1.0**	**(0.79, 1.19)**

Figure HP13: Cumulative percentage revision of Primary Bipolar Hip Procedures by Femoral Cement (primary diagnosis Fractured NOF excluding infection)



Fixation	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Cemented	4512	3503	2947	2423	1953	1529	1122	733	431	231	116
Cementless	873	641	523	402	285	197	144	82	43	24	18

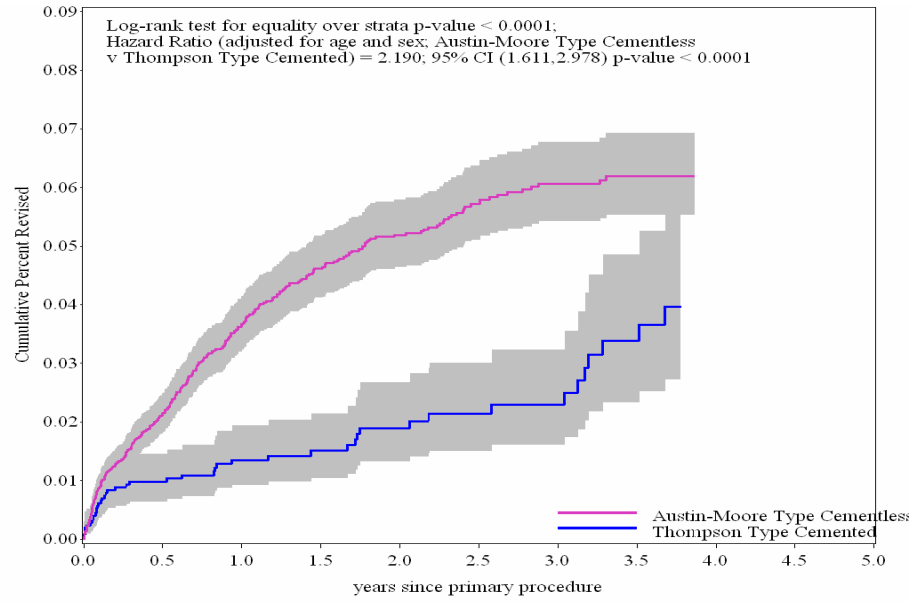
Table HP27: Yearly cumulative percentage revision of Primary Bipolar Hip Procedures by Femoral Cement

Fixation	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Cemented	1.31 (0.99, 1.73)	1.94 (1.51, 2.48)	2.34 (1.83, 3.00)
Cementless	2.83 (1.84, 4.33)	3.07 (2.01, 4.68)	3.42 (2.23, 5.24)

Table HP28: Primary Unipolar Monoblock Procedure requiring Revision

Unipolar Monoblock	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Austin-Moore Type Cemented	3	251	1.2	288	1.0	(0.21, 3.04)
Austin-Moore Type Cementless	351	9309	3.8	14718	2.4	(2.14, 2.65)
ETS Cemented	1	156	0.6	89	1.1	(0.03, 6.25)
Thompson Type Cemented	46	2631	1.7	4180	1.1	(0.81, 1.47)
Thompson Type Cementless	12	259	4.6	458	2.6	(1.35, 4.58)
Total	**413**	**12606**	**3.3**	**19733**	**2.1**	**(1.90, 2.30)**

Figure HP14: Cumulative percentage revision of Austin Moore and Thompson Hip Prostheses



Unipolar Monoblock	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Austin-Moore Type Cementless	9309	6350	5059	4038	3142	2395	1769	1212	752	400	170
Thompson Type Cemented	2631	1816	1453	1122	868	651	494	351	230	138	71

Table HP29: Yearly cumulative percentage revision of Austin Moore and Thompson Hip Prostheses

Unipolar Monoblock	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Austin-Moore Type Cementless	3.66 (3.24, 4.14)	5.19 (4.65, 5.79)	6.06 (5.43, 6.77)
Thompson Type Cemented	1.35 (0.93, 1.94)	1.90 (1.34, 2.69)	2.29 (1.62, 3.25)

Table HP30: Primary Unipolar Modular Procedures requiring Revision

Femoral Component	*Unipolar*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Alloclassic	Unipolar Head (Sulzer)	3	148	2.0	219	1.4	(0.28, 4.00)
Alloclassic SL	Unipolar Head (Sulzer)	7	148	4.7	291	2.4	(0.97, 4.96)
Alloclassic SL	Unipolar Head (Zimmer)	0	71	0.0	27	0.0	(0.00, 13.50)
CCA	Hemi Head (Mathys)	5	280	1.8	539	0.9	(0.30, 2.16)
CPCS	Unipolar Head (S&N)	0	101	0.0	46	0.0	(0.00, 7.95)
CPT	Unipolar Type (Zimmer)	6	146	4.1	460	1.3	(0.48, 2.84)
CPT	VerSys Endo	5	257	1.9	269	1.9	(0.60, 4.34)
Elite Plus	Hemi Head (Depuy)	0	64	0.0	111	0.0	(0.00, 3.31)
Exeter V40	Unitrax	15	813	1.8	1099	1.4	(0.76, 2.25)
Fullfix Stem	Hemi Head (Mathys)	2	183	1.1	255	0.8	(0.09, 2.83)
SL-Plus	Unipolar (Endoprothetik)	3	170	1.8	194	1.5	(0.32, 4.52)
Spectron EF	Unipolar Head (S&N)	11	492	2.2	759	1.4	(0.72, 2.59)
Thompson Mod	Ultima	1	124	0.8	340	0.3	(0.01, 1.64)
VerSys	VerSys Endo	1	55	1.8	57	1.8	(0.04, 9.83)
Other (56)	-	14	407	3.4	521	2.7	(1.47, 4.51)
Total		**73**	**3459**	**2.1**	**5189**	**1.4**	**(1.10, 1.77)**

Note: *[†]total number equals total unipolar modular*

Table HP31: Yearly cumulative percentage revision of Primary Unipolar Modular Prostheses

Femoral Component	*Unipolar*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
Alloclassic	Unipolar Head (Sulzer)	2.31 (0.75, 6.99)	2.31 (0.75, 6.99)		
Alloclassic SL	Unipolar Head (Sulzer)	4.97 (2.26, 10.74)	5.95 (2.87, 12.11)	5.95 (2.87, 12.11)	
CCA	Hemi Head (Mathys)	1.37 (0.44, 4.20)	2.76 (1.13, 6.65)	2.76 (1.13, 6.65)	2.76 (1.13, 6.65)
CPT	Unipolar Type (Zimmer)	0.76 (0.11, 5.29)	2.31 (0.75, 7.00)	3.31 (1.25, 8.64)	5.28 (2.05, 13.27)
CPT	VerSys Endo	1.86 (0.70, 4.90)	1.86 (0.70, 4.90)		
Exeter V40	Unitrax	1.24 (0.61, 2.51)	3.15 (1.80, 5.48)	3.15 (1.80, 5.48)	
Fullfix Stem	Hemi Head (Mathys)	0.60 (0.08, 4.15)	1.98 (0.45, 8.50)	1.98 (0.45, 8.50)	
SL-Plus	Unipolar (Endoprothetik)	1.29 (0.33, 5.08)	2.47 (0.76, 7.85)		
Spectron EF	Unipolar Head (S&N)	2.01 (1.00, 4.05)	3.29 (1.66, 6.48)	3.29 (1.66, 6.48)	
Thompson Mod	Ultima	0.85 (0.12, 5.86)	0.85 (0.12, 5.86)	0.85 (0.12, 5.86)	0.85 (0.12, 5.86)
VerSys	VerSys Endo	3.57 (0.51, 22.76)	3.57 (0.51, 22.76)		
Other		4.02 (2.26, 7.12)	4.70 (2.67, 8.23)	4.70 (2.67, 8.23)	

Table HP32: Primary Bipolar Procedures requiring Revision

Femoral Component	*Bipolar*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
ABGII	UHR	5	120	4.2	174	2.9	(0.93, 6.71)
Alloclassic	Bipolar Ballhead (Sulzer)	1	144	0.7	227	0.4	(0.01, 2.45)
Alloclassic SL	Bipolar Ballhead (Sulzer)	3	131	2.3	220	1.4	(0.28, 3.98)
C-Stem	Endo Cup (Depuy)	1	95	1.1	146	0.7	(0.02, 3.81)
C-Stem	Hastings	4	121	3.3	302	1.3	(0.36, 3.39)
CCA	Bipolar Head (Mathys)	2	84	2.4	165	1.2	(0.15, 4.38)
CPCS	Convene	5	307	1.6	404	1.2	(0.40, 2.89)
CPCS	Tandem	0	94	0.0	32	0.0	(0.00, 11.54)
CPT	Multipolar Bipolar	1	53	1.9	64	1.6	(0.04, 8.76)
Charnley	Hastings	1	65	1.5	102	1.0	(0.02, 5.44)
Corail	Hastings	2	81	2.5	93	2.2	(0.26, 7.80)
Elite Plus	Endo Cup (Depuy)	0	215	0.0	398	0.0	(0.00, 0.93)
Elite Plus	Hastings	9	292	3.1	650	1.4	(0.63, 2.63)
Exeter	Centrax	5	202	2.5	708	0.7	(0.23, 1.65)
Exeter	UHR	7	203	3.4	622	1.1	(0.45, 2.32)
Exeter V40	Centrax	0	64	0.0	216	0.0	(0.00, 1.71)
Exeter V40	UHR	42	2178	1.9	3561	1.2	(0.85, 1.59)
Omnifit	UHR	15	277	5.4	634	2.4	(1.32, 3.90)
Spectron EF	Convene	4	158	2.5	358	1.1	(0.30, 2.86)
VerSys	Multipolar Bipolar	0	174	0.0	173	0.0	(0.00, 2.13)
Other (137)	-	31	976	3.2	1727	1.8	(1.22, 2.55)
Total		**138**	**6034**	**2.3**	**10976**	**1.3**	**(1.06, 1.49)**

Table HP33: Yearly cumulative percentage revision of Bipolar Hip Prostheses

Femoral Component	*Biipolar*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
ABGII	UHR	4.03 (1.50, 10.61)	4.03 (1.50, 10.61)	4.03 (1.50, 10.61)	
Alloclassic	Bipolar Ballhead (Sulzer)	0.76 (0.11, 5.26)	0.76 (0.11, 5.26)		
Alloclassic SL	Bipolar Ballhead (Sulzer)	2.16 (0.52, 8.74)	3.94 (1.22, 12.33)	3.94 (1.22, 12.33)	
C-Stem	Endo Cup (Depuy)	. (0.00, .)	1.61 (0.23, 10.90)		
C-Stem	Hastings	1.73 (0.43, 6.73)	2.81 (0.91, 8.51)	4.61 (1.66, 12.46)	4.61 (1.66, 12.46)
CCA	Bipolar Head (Mathys)	1.41 (0.20, 9.58)	3.42 (0.85, 13.28)	3.42 (0.85, 13.28)	
CPCS	Convene	1.56 (0.59, 4.15)	2.20 (0.90, 5.35)		
CPT	Multipolar Bipolar	2.13 (0.30, 14.16)	2.13 (0.30, 14.16)		
Charnley	Hastings	. (0.00, .)	3.70 (0.53, 23.51)	3.70 (0.53, 23.51)	
Corail	Hastings	2.96 (0.75, 11.37)	2.96 (0.75, 11.37)		
Elite Plus	Hastings	1.68 (0.63, 4.45)	3.37 (1.60, 7.01)	4.29 (2.09, 8.67)	4.29 (2.09, 8.67)
Exeter	Centrax	2.09 (0.79, 5.48)	2.75 (1.15, 6.50)	2.75 (1.15, 6.50)	2.75 (1.15, 6.50)
Exeter	UHR	1.64 (0.53, 5.01)	2.24 (0.84, 5.87)	3.72 (1.67, 8.18)	4.52 (2.16, 9.35)
Exeter V40	UHR	1.88 (1.34, 2.63)	2.42 (1.77, 3.32)	2.56 (1.87, 3.52)	
Omnifit	UHR	4.77 (2.73, 8.26)	5.35 (3.12, 9.08)	5.35 (3.12, 9.08)	6.58 (3.73, 11.46)
Spectron EF	Convene	1.27 (0.32, 4.98)	2.19 (0.70, 6.78)	3.43 (1.25, 9.26)	3.43 (1.25, 9.26)
Other		3.23 (2.22, 4.70)	3.63 (2.51, 5.23)	4.20 (2.91, 6.06)	

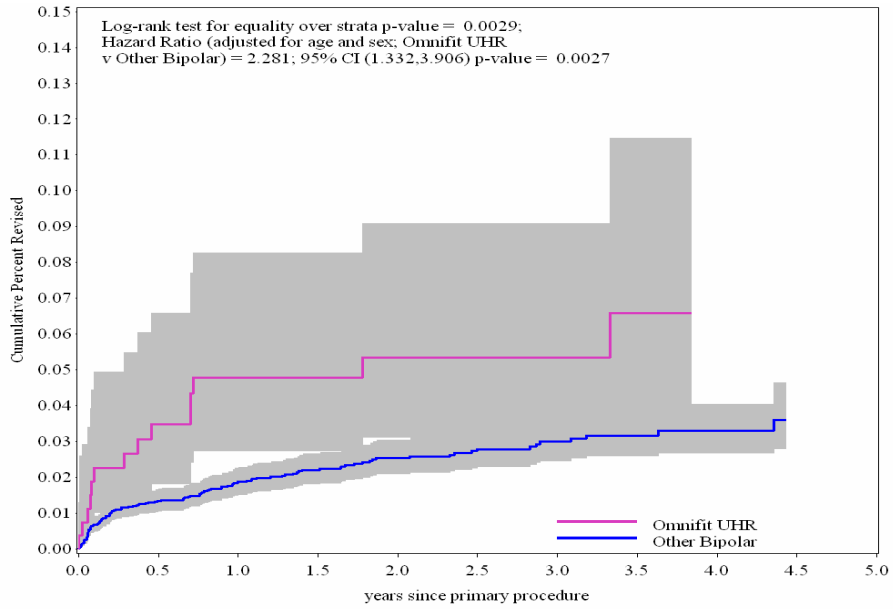
Table HP34: Bipolar Type (Biomet) and Other Bipolar Components requiring revision

Bipolar	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Bipolar Type (Biomet)	6	80	7.5	134	4.5	(1.64, 9.72)
Other Bipolar	132	5954	2.2	10841	1.2	(1.02, 1.44)
All Bipolar	**138**	**6034**	**2.3**	**10976**	**1.3**	**(1.06, 1.49)**

Table HP35: Omnifit and UHR Bipolar Heads Procedures requiring Revision

Bipolar	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Omnifit UHR	15	277	5.4	634	2.4	(1.32, 3.90)
Other Bipolar	123	5757	2.1	10342	1.2	(0.99, 1.42)
Total	**138**	**6034**	**2.3**	**10976**	**1.3**	**(1.06, 1.49)**

Figure HP15: Cumulative percentage revision of Omnifit and UHR Bipolar Heads Prostheses



Bipolar	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Omnifit UHR	277	232	207	176	149	116	95	66	45	21	18
Other Bipolar	5757	4352	3618	2924	2318	1783	1290	820	472	251	125

Table HP36: Omnifit and UHR Bipolar Heads Procedure requiring Revision

Bipolar	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Omnifit UHR	4.77 (2.73, 8.26)	5.35 (3.12, 9.08)	5.35 (3.12, 9.08)
Other Bipolar	1.87 (1.52, 2.30)	2.53 (2.09, 3.06)	2.99 (2.47, 3.62)

Primary Total Hip Replacement

This report is based on the analysis of 92,210 primary total hip replacement procedures. In this category of hip replacement there are 84,872 primary conventional total hips, 7,205 resurfacing and 133 thrust plate procedures.

Usage

Primary total hips are largely used in the treatment of chronic joint disease in particular arthritis with osteoarthritis being the most common diagnosis (88.4%).

Conventional total hip is by far the most common type of primary total hip replacement. They account for 92.1% of all primary total hips recorded by the Registry. The other types of primary total hip are resurfacing procedures (7.8%) and thrust plate procedures (0.1%) (Table HG1). There is no further comment about the thrust plate prosthesis as the Registry has recorded only 133 procedures.

The proportion of conventional hips has declined in recent years due to the increasing use of resurfacing procedures. The use of resurfacing procedures has increased from 5.6% of all primary total hips in 2001 to 8.9% in 2005 (Figure HT1).

There is considerable regional variability in the use of resurfacing procedures. In 2005 it was 17.1% of all primary total hip procedures in the ACT/NT but in Western Australia it was 1.4% (Figure HT1).

Primary Conventional Total Hip

The Exeter V40 stem is the most common femoral stem in primary conventional total hip replacement. During 2005 it was used in 23.4% of all primary conventional total hip procedures (Table HT2 and Figure HT2).

The five most common femoral stems were used in 44.0% of all procedures, the next five in a further 17.7% and the remaining 89 femoral stems in 38.3% of primary conventional total hips. There has been an increase in the number of different types of femoral components used in 2005. In 2004 this figure was 85 and in 2005 there were 99 different femoral components used (Table HT2). This increase however was not consistent across cemented and cementless femoral stems. The number of cemented femoral stems used in 2005 actually declined (Table HT3). All of the additional femoral stems were cementless femoral stems (Table HT4). The 10 most frequently used cemented and cementless femoral components have been detailed in (Table HT3, Table HT4 Figure HT3 and Figure HT4).

The Trident was the most frequently used acetabular component (28.9% of all primary conventional total hip procedures) (Table HT5 and Figure HT5). The five most common acetabular components were used in 59.6% of all procedures. The next five in a further 16.3% and the remaining 79 in 24.1% of primary conventional total hips undertaken in 2005 (Table HT5). As with the femoral component there has been an increase in the number of different types of acetabular component used in 2005. They have increased from 72 in 2004 to 89 in 2005 (Table HT5). This increase is entirely the result of an increase in the number of different types of cementless acetabular components used. The 10 most frequently used cemented and cementless acetabular components have been detailed in (Table HT6, Table HT7 Figure HT6 and Figure HT7).

Resurfacing

Since the introduction of resurfacing procedures there has been a steady increase in the number of different types of prostheses being used. In 2005 ten different types of resurfacing prostheses where used. The BHR has remained by far the most used prosthesis (63.5% of all resurfacings in 2005). Its proportional use however has decreased from 96.3% in 2001. Of the remaining prostheses there is only a small number that at this stage have any significant use. There are three

prostheses with over 250 procedures (Table HT8).

Changes in use with Gender and Age

There are gender and age differences when comparing primary conventional total hip and resurfacing procedures. Resurfacing procedures are undertaken more frequently in males and younger patients than primary conventional total hip replacements. Primary conventional total hips are used more commonly in women (55.9% in 2005) and 65.4% are undertaken in individuals 65 years or older (Table HT9 and Table HT11). Resurfacing procedures are used most often in males (72.8% in 2005) and 90.4% of procedures are undertaken in individuals younger than 65 years (Table HT10 and Table HT12).

There has been very little change in use related to gender and age in both primary conventional total hip and resurfacing procedures in the last five years (Tables HT9-12).

Fixation

Cementless primary conventional total hips (46.5%) are used more often than hybrid (31.9%) and cemented procedures (13.6%) (Table HT1). Over the last five years there has been significant change in the approach to fixation of primary conventional total hip replacements. Cementless fixation has increased from 41.2% in 2001 to 57.5% in 2005. Hybrid fixation has reduced from 37.6% to 32.1% over the same period and cement fixation has halved from 21.2% to 10.4% (Figure HT8).

Cementless fixation has been increasing in every state and territory but the proportion of primary conventional total hips that are cementless varies. In 2005 cementless fixation ranged from 89.6% in Tasmania to 36% in Queensland. Queensland has the highest rate of cement fixation (24.5%) and South Australia the highest rate of hybrid fixation (43.2%) (Figure HT8)

Resurfacing hips are nearly all hybrid fixation but a small number of cementless resurfacing procedures have been undertaken (data not shown).

Outcomes Primary Total Hip Replacement

Conventional total hip are revised less often than resurfacing procedures, (hazard ratio (adjusted for age and sex) resurfacing v conventional =1.427; 95%CI (1.184,1.720) P=0.0002). At four years the cumulative percentage revision of resurfacing procedures is 3.0% compared to 2.4% for all conventional primary hips (Table HT13, Table HT14 and Figure HT9).

Age and Gender

There is no statistical difference in the revision rates for primary conventional total hip replacement with respect to age. It appears that individuals 75 years and older have a higher earlier revision rate. However between 2 and 3 years, the number of revisions in this group declines. By four years the cumulative percentage revision for individuals in this group is lower compared to the under 65 age groups (Table HT15, Table HT16 and Figure HT10).

Unlike conventional total hips, resurfacing procedures have a significant variation in the rate of revision with age. The younger the age the lower the revision rate (Table HT17, Table HT18 and Figure HT11)

There is no difference in outcome of primary conventional total hip with respect to gender (Table HT19, Table HT20, and Figure HT12).

The Registry has previously reported the significant gender difference of resurfacing procedures. Females have a significantly higher revision rate and at three years they have twice the cumulative percentage revision compared to males (4.2% and 2.17% respectively). Table HT21, Table HT22 and Figure HT13.

When the analysis combines age and gender further differences are observed. In primary conventional hip, females under the age of 55 initially have a lower revision rate but as time progresses revisions increase at a faster rate compared to the other age groups (Table HT23,

Table HT24 and Figure HT14). In males the initial higher earlier rate of revision of the 75 and over age group is more apparent than with females and is maintained for a longer period. There is no difference in revision rates of the other age groups (Table HT23, Table HT24 and Figure HT15).

The combined age and gender analysis for resurfacing procedures demonstrates that females have a higher revision rate than males at any age group. The highest revision rate in males is in the over 65 year old age group. Females with the lowest revision rate are under 55 but this rate is similar to males over 65 (Table HT25 and Table HT26).

Fixation

Cementless primary conventional hip replacements have a higher revision rate than cemented and hybrid hips. There is no significant difference between hybrid and cemented hips. At four years the cumulative percentage revisions for cemented primary conventional hips is 1.98%, hybrid 2.08% and cementless hips 2.77% (hazard ratio (adjusted for age and sex) cementless v cemented = 1.536; 95% CI (1.285,1.835) P <0.0001); (hazard ratio (adjusted for age and sex) cementless v hybrid = 1.417; 95% CI (1.246,1.613) P <0.0001); (hazard ratio (adjusted for age and sex) hybrid v cemented = 1.084; 95% CI (0.901,1.303) P = 0.393) (Table HT27, Table HT28 and Figure HT16).

Cemented and hybrid hip replacements have lower revision rates at any age compared to cementless primary conventional total hips. The revision rate for cementless primary conventional total hips increases with age and the difference between cementless hips and cemented and hybrid fixation is most evident in individuals 75 years and older (Table HT29, Table HT30 and Figure HT17-20). The cumulative percentage revision at 3 years for this age group is cementless (2.81%), cemented (1.52%) and hybrid (1.71%) (Table HT30).

Prosthesis Specific outcomes

Primary Conventional Total Hip

The outcomes for individual prostheses used in primary conventional total hip replacement are detailed in (Tables HT31-HT36). There are two tables each for cemented, cementless and hybrid prostheses. The first table provides information on the number of procedures, the number and percentage of revisions and the revisions per 100 observed component years. The second table for each of these groups is the yearly cumulative percentage revision. Data are presented for the most common stem and acetabular combinations. It is not possible or valuable to present the results of all recorded combinations. This is because so many combinations have been used and many of these combinations have been used in small numbers which precludes meaningful statistical analysis. The tables have been limited to include only those stem and acetabular combinations with 250 or more procedures. This totals 68 of the possible 1,034 combinations for conventional primary total hip replacement. Although it is a small number of the possible combinations these 68 represent 78.3% of all primary conventional total hip procedures.

These tables permit a comparison of the revision rates for each of the identified combinations. The relevance of this comparison is greater for those procedures that have been undertaken most frequently. It is worth highlighting that the revision rates for those combinations that have not been identified have been presented as a combined revision rate for that group. The revision rate for this combined group is almost always higher than any of the individually identified combinations.

There are 12 cemented primary conventional total hip stem/acetabular combinations listed (Table HT31 and Table HT32). The number of revisions per 1000 observed component years varies from 0.2 to 1.0. Nine of these combinations have over 1000 observed component years and of these the three

least revised are the MS30/low profile, Exeter/Exeter and Spectron EF/Reflection combinations (0.2, 0.3 and 0.4 revisions per 100 observed component years respectively). These combinations also have the lowest revision rates at 4 years compared to other combinations with more than 1000 observed component years.

In recent years the Contemporary cup has replaced the Exeter cup and the Exeter V40 stem has replaced the Exeter stem. The Exeter V40/Contemporary cup combination has a higher revision rate than the Exeter/Exeter combination (Table HT31 and Table HT32).

In the Cementless primary conventional total hip replacement group the revisions per 100 observed component years vary from 0.6 to 2.3 (Table HT33). All of the cementless combinations have a higher revision rate compared to the three best-performed cemented combinations. There are 24 combinations with over 1,000 observed component years. Five of these have 0.6 revisions per 100 observed component years. These are the Alloclassic SL/Allofit, Citation/Vitalock, Natural Hip/Fitmore, SRom/Option and the Stability/Duroloc combinations (Table HT33). At 4 years however there are only two combinations that have less than 2.0% cumulative percentage revision. These are the Alloclassic SL/Allofit and SRom/Option (1.77% and 1.84% respectively) (Table HT34).

The range of revisions per 100 observed component years for the hybrid fixation group is 0.1 to 1.3 (Table HT35). There are 18 combinations with over 1,000 observed component years. The three least revised combinations are the Definition/Vitalock, MS30/Fitmore and the Exeter/Mallory Head (Table HT35). These combinations have equivalent outcomes to the best cemented combinations. When considering the cumulative revision rate the Definition/Vitalock and the MS30/Fitmore have the least number of revision at 4 years (Table HT36).

Resurfacing Hips

The least revised resurfacing prosthesis is the BHR. There is significant variation in the frequency of revision of the different resurfacing prostheses, some of which have only been used in quite small numbers to 31st December 2005 (Tables HT37 and HT38). There are only four prostheses that have over 100 procedures. Two of these prostheses have a significantly higher revision rate when compared to the BHR. These are the Cormet 2000 and the Durom (hazard ratio (adjusted for age and sex) Cormet 2000 v BHR = 2.114; 95% CI (1.217, 3.673) p=0.0079); (hazard ratio (adjusted for age and sex) Durom v BHR = 1.893; 95% CI (1.042, 3.438) p=0.0362). The ASR has a higher revision rate when compared to the BHR but it is not significant (hazard ratio (adjusted for age and sex) ASR v BHR = 1.429; 95% CI (0.873, 2.340) p=0.1555).

Individual Conventional Hip Prostheses with a Higher than anticipated revision rate

These data are presented differently from previous years. The Registry uses a specifically designed algorithm to identify prostheses that have a higher than anticipated revision rate compared to other prostheses of the same type. The algorithm has previously been explained in the introduction to this and previous reports.

The mixing and matching of femoral and acetabular components presents some difficulty in identifying those prostheses that have a higher than anticipated rate of revision. A particular femoral stem or acetabular component may have a higher than anticipated rate of revision independent of any other component that it is combined with or it may well be dependent on the particular component that is used in association with it. As a consequence the Registry is able to identify combinations of prostheses as well as individual femoral and acetabular components that have a higher anticipated revision rate.

Those combinations and individual femoral and acetabular components that have been identified by the algorithm are

listed in Table HT39 and Table HT40. When an individual component is listed it has a higher than anticipated revision rate which is independent of what ever it is combined with.

The first combination listed highlights the issue well. This is the Alloclassic/Fitmore combination (note: not Alloclassic SL). These two components have not been identified individually as having a revision rate that is higher than anticipated. When combined however this combination has a significantly higher revision rate compared to all the other cementless combinations

In addition to the Margron femoral stem and the SPH Blind acetabular component that the Registry has previously identified, an additional five femoral stem/acetabular component combinations as well as two additional femoral stems and five acetabular components have been identified this year (Table HT39 and HT40).

Cumulative percentage revision graphs have been provided for those identified prostheses and prostheses combinations where there has been greater than 100 procedures recorded by the Registry (Figures HT21-28). Cementless prostheses are compared to all other cementless prostheses and cemented prostheses are compared to all other cemented prostheses.

Primary Total Hip Replacement - 1/9/1999 to 31/12/2005

Prosthesis Usage

Table HT1: Prosthesis Usage - Primary Hip Replacement by State and Territory

State	*Conventional Hips*						*Resurfacing*		*Thrust Plate*		*Total*	
	Cemented		*Cementless*		*Hybrid*							
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
ACT/NT	63	3.0	1234	59.7	554	26.8	216	10.4	.	.	2067	100.0
NSW	1207	4.7	14899	57.6	7632	29.5	2132	8.2	11	0.0	25881	100.0
QLD	4404	30.4	3839	26.5	5198	35.9	1036	7.2	.	.	14477	100.0
SA	1946	18.8	3614	34.9	4095	39.6	696	6.7	.	.	10351	100.0
TAS	310	9.3	2638	79.4	325	9.8	41	1.2	10	0.3	3324	100.0
VIC	3846	14.8	11107	42.7	8215	31.6	2846	10.9	1	0.0	26015	100.0
WA	784	7.8	5540	54.9	3422	33.9	238	2.4	111	1.1	10095	100.0
Australia	**12560**	**13.6**	**42871**	**46.5**	**29441**	**31.9**	**7205**	**7.8**	**133**	**0.1**	**92210**	**100.0**

Figure HT1: Trends in Usage for Primary Hip Replacement by State and Territory

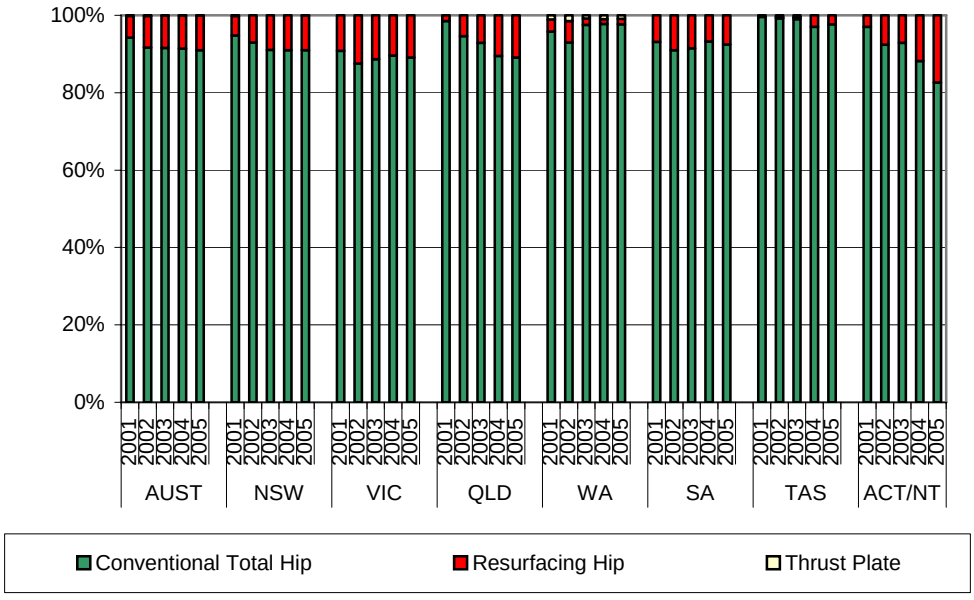


Table HT2: 10 Most common Femoral components used in Primary Conventional Total Hips

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Exeter (1636)	Exeter V40 (3225)	Exeter V40 (3897)	Exeter V40 (4182)	Exeter V40 (4373)
2	Exeter V40 (1132)	ABGII (1069)	ABGII (1027)	Synergy (1366)	Synergy (1246)
3	Omnifit (741)	Spectron EF (840)	Synergy (998)	ABGII (901)	Accolade (935)
4	Spectron EF (711)	Elite Plus (751)	VerSys (881)	Alloclassic (844)	Corail (930)
5	Elite Plus (637)	Synergy (747)	Spectron EF (782)	Spectron EF (800)	ABGII (753)
6	Alloclassic SL (463)	VerSys (702)	Secur-Fit Plus (709)	Secur-Fit Plus (759)	Alloclassic SL (724)
7	Secur-Fit Plus (443)	Alloclassic SL (688)	Omnifit (619)	VerSys (692)	Spectron EF (714)
8	CPT (408)	Omnifit (688)	C-Stem (561)	Accolade (575)	VerSys (674)
9	ABGII (401)	Secur-Fit Plus (590)	Alloclassic SL (492)	CPT (552)	Secur-Fit Plus (657)
10	Synergy (393)	C-Stem (484)	Secur-Fit (482)	Omnifit (517)	Summit (543)
% using 10 most common	62.1%	61.9%	61.3%	62.1%	61.7%
Total N Procedures	11220	15811	17032	18021	18708
Total N Prosthesis Types	74	88	83	85	99

Figure HT2: 5 Most common Femoral components used in Primary Conventional Total Hips

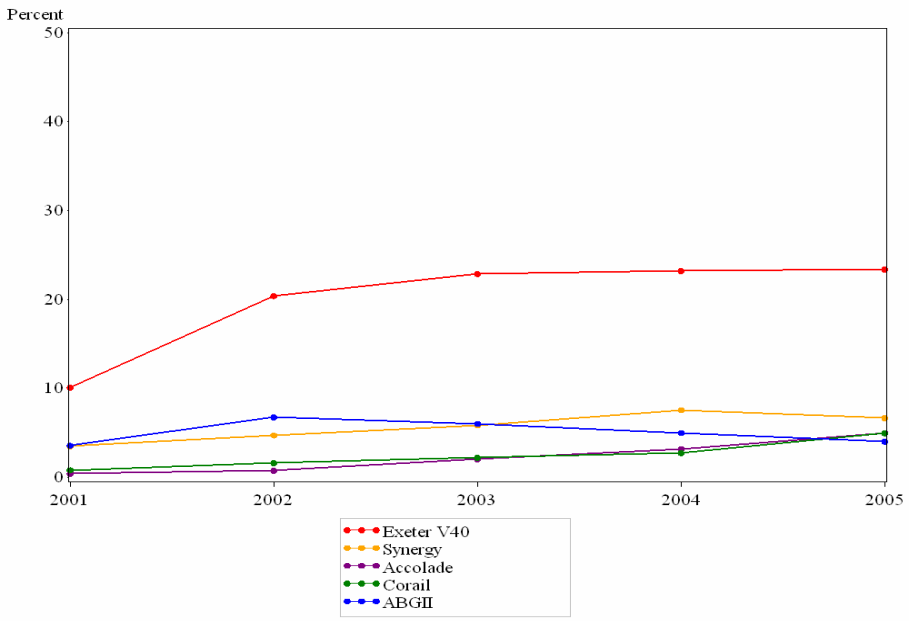


Table HT3: 10 Most common Primary Conventional Total Femoral Components used with Cement Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Exeter (1635)	Exeter V40 (3223)	Exeter V40 (3897)	Exeter V40 (4181)	Exeter V40 (4371)
2	Exeter V40 (1130)	Spectron EF (840)	Spectron EF (782)	Spectron EF (800)	Spectron EF (714)
3	Spectron EF (711)	Elite Plus (751)	C-Stem (561)	CPT (552)	CPT (499)
4	Elite Plus (637)	C-Stem (484)	CPT (476)	C-Stem (453)	C-Stem (374)
5	CPT (408)	CPT (462)	Elite Plus (444)	CPCS (376)	CPCS (357)
6	Charnley (383)	Charnley (398)	MS 30 (357)	Elite Plus (351)	Elite Plus (246)
7	MS 30 (355)	MS 30 (384)	Omnifit (340)	Omnifit (282)	MS-30 (223)
8	Omnifit (349)	Exeter (378)	Charnley (320)	MS 30 (249)	Omnifit (221)
9	C-Stem (288)	Omnifit (366)	CPCS (243)	Charnley (201)	Charnley (218)
10	Definition (157)	CPCS (180)	VerSys (144)	VerSys (115)	VerSys (115)
% using 10 most common	92.1%	91.1%	91.8%	92.7%	93.7%
Total N Procedures	6574	8199	8238	8156	7834
Total N Prosthesis Types	43	45	45	41	39

Figure HT3: 5 Most common Primary Conventional Total Femoral Components used with Cement Fixation

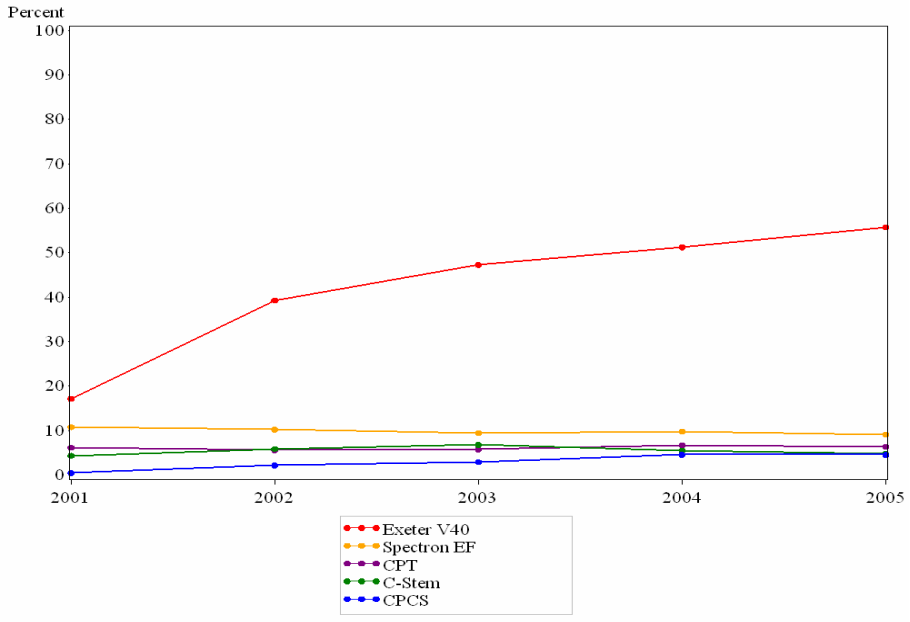


Table HT4: 10 Most common Primary Conventional Total Femoral Components used with Cementless Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Alloclassic SL (463)	ABGII (1066)	ABGII (1023)	Synergy (1356)	Synergy (1232)
2	Secur-Fit Plus (441)	Synergy (740)	Synergy (977)	ABGII (901)	Accolade (933)
3	ABGII (400)	Alloclassic SL (688)	VerSys (737)	Alloclassic (842)	Corail (930)
4	Omnifit (392)	Secur-Fit Plus (589)	Secur-Fit Plus (708)	Secur-Fit Plus (758)	ABGII (753)
5	Synergy (391)	VerSys (538)	Alloclassic SL (492)	VerSys (577)	Alloclassic SL (724)
6	Secur-Fit (317)	Secur-Fit (474)	Secur-Fit (482)	Accolade (573)	Secur-Fit Plus (656)
7	S-Rom (247)	S-Rom (430)	S-Rom (479)	Corail (493)	VerSys (559)
8	Mallory-Head (222)	Omnifit (322)	Corail (376)	S-Rom (492)	Summit (543)
9	VerSys (217)	CLS (258)	Accolade (333)	Secur-Fit (447)	Alloclassic (481)
10	CLS (206)	Corail (256)	Mallory-Head (329)	Summit (403)	Secur-Fit (474)
% using 10 most common	70.9%	70.4%	67.5%	69.4%	67%
Total N Procedures	4646	7612	8794	9865	10874
Total N Prosthesis Types	52	67	60	62	75

Figure HT4: 5 Most common Primary Conventional Total Femoral Components used with Cementless Fixation

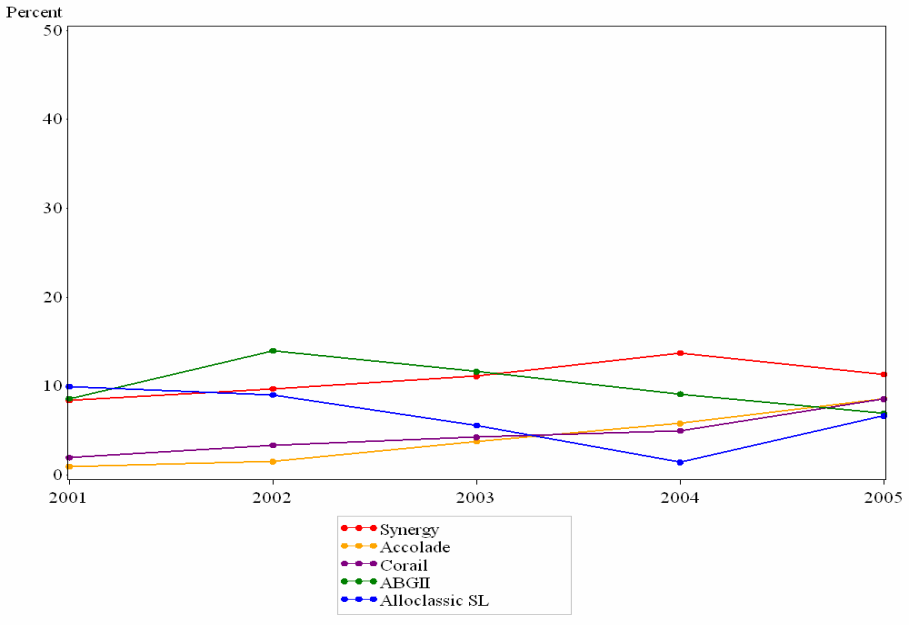


Table HT5: 10 Most common Acetabular components used in Primary Conventional Total Hips

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Trident (1650)	Trident (2832)	Trident (3979)	Trident (4715)	Trident (5400)
2	Reflection (1205)	Reflection (1787)	Reflection (1994)	Reflection (2424)	Reflection (2100)
3	Vitalock (1088)	Trilogy (1287)	Trilogy (1519)	Trilogy (1385)	Pinnacle (1375)
4	Duraloc (799)	ABGII (1214)	Vitalock (952)	Pinnacle (1081)	Trilogy (1337)
5	Trilogy (707)	Vitalock (1179)	Duraloc (900)	Allofit (875)	Allofit (947)
6	Mallory-Head (701)	Duraloc (1117)	ABGII (825)	Contemporary (795)	Contemporary (901)
7	ABGII (673)	Contemporary (719)	Allofit (790)	ABGII (742)	Mallory-Head (641)
8	Contemporary (527)	Mallory-Head (719)	Contemporary (767)	Duraloc (627)	ASR (574)
9	Exeter (474)	Allofit (630)	Mallory-Head (729)	Mallory-Head (597)	Fitmore (494)
10	Fitmore (424)	Fitmore (604)	Pinnacle (536)	Fitmore (585)	Duraloc (445)
% using 10 most common	73.5%	76.5%	76.3%	76.7%	76%
Total N Procedures	11220	15811	17032	18021	18708
Total N Prosthesis Types	61	72	74	72	89

Figure HT5: 5 Most common Acetabular components used in Primary Conventional Total Hips

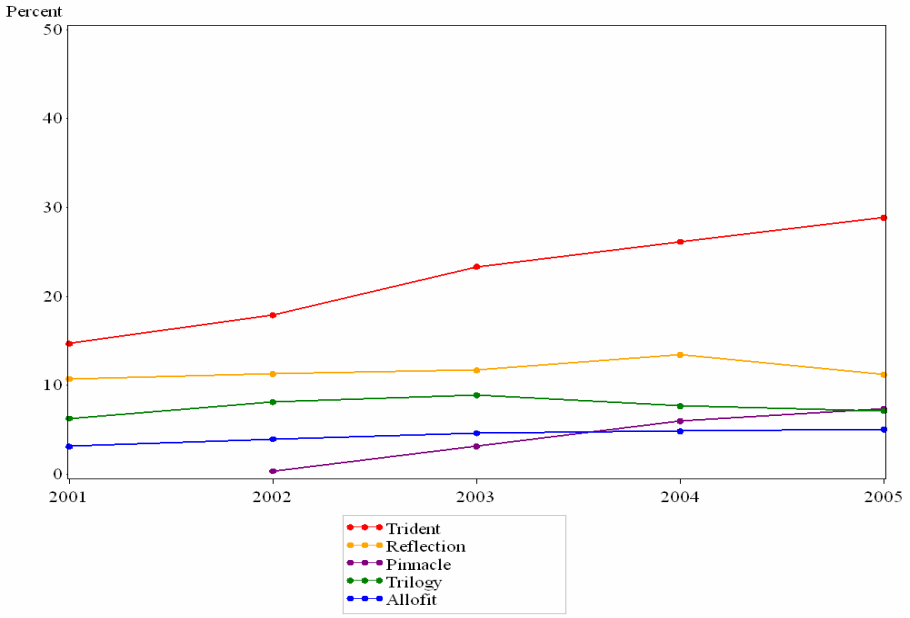


Table HT6: 10 Most common Primary Conventional Total Acetabular Components used with Cement Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Contemporary (527)	Contemporary (719)	Contemporary (767)	Contemporary (795)	Contemporary (900)
2	Exeter (474)	Reflection (341)	Exeter (256)	Reflection (316)	Reflection (219)
3	Reflection (236)	Exeter (314)	Reflection (256)	Exeter (224)	Exeter (134)
4	Charnley (204)	Charnley Ogee (232)	Charnley Ogee (199)	Charnley Ogee (190)	Charnley Ogee (96)
5	Charnley Ogee (202)	Charnley (189)	Elite Plus LPW (149)	Elite Plus Ogee (117)	Charnley (74)
6	Elite Plus Ogee (155)	Elite Plus Ogee (125)	Low Profile Cup (130)	ZCA (95)	Elite Plus Ogee (70)
7	Low Profile Cup (139)	Elite Plus LPW (118)	Elite Plus Ogee (109)	Low Profile Cup (93)	Low Profile Cup (66)
8	ZCA (102)	Low Profile Cup (104)	Charnley (102)	Elite Plus LPW (51)	Elite Plus LPW (64)
9	Apollo (79)	Charnley LPW (88)	ZCA (90)	Brunswick (39)	ZCA (64)
10	Charnley LPW (63)	Apollo (81)	Brunswick (64)	Charnley (39)	Brunswick (56)
% using 10 most common	90.5%	87.9%	87%	87.6%	88.7%
Total N Procedures	2409	2628	2440	2237	1965
Total N Prosthesis Types	37	35	41	41	41

Figure HT6: 5 Most common Primary Conventional Total Acetabular Components used with Cement Fixation

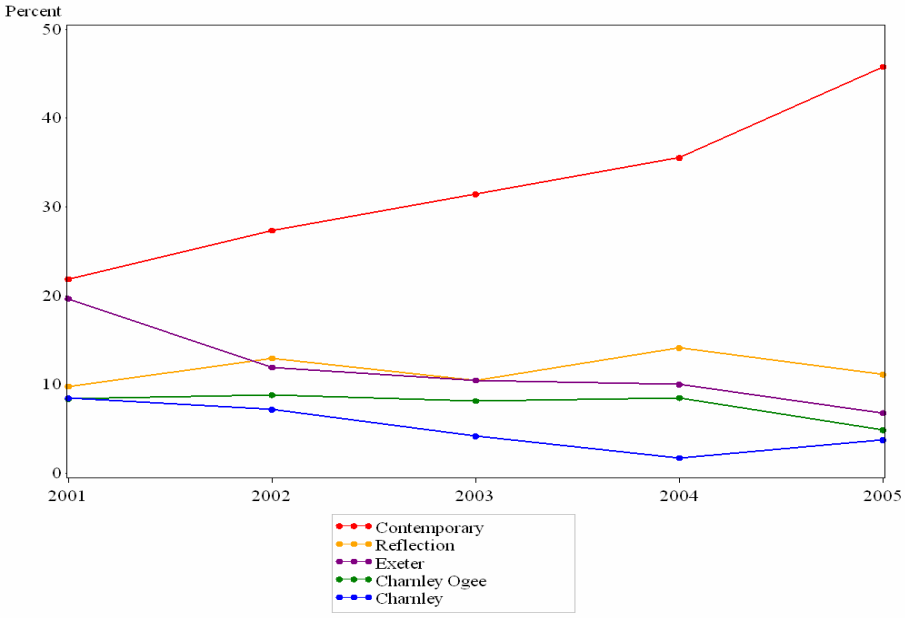


Table HT7: 10 Most common Primary Conventional Total Acetabular Components used with Cementless Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Trident (1648)	Trident (2821)	Trident (3974)	Trident (4702)	Trident (5386)
2	Vitalock (1082)	Reflection (1446)	Reflection (1738)	Reflection (2108)	Reflection (1881)
3	Reflection (969)	Trilogy (1280)	Trilogy (1519)	Trilogy (1383)	Pinnacle (1375)
4	Duraloc (792)	ABGII (1214)	Vitalock (951)	Pinnacle (1079)	Trilogy (1336)
5	Trilogy (706)	Vitalock (1177)	Duraloc (895)	Allofit (873)	Allofit (945)
6	Mallory-Head (698)	Duraloc (1114)	ABGII (824)	ABGII (740)	Mallory-Head (640)
7	ABGII (672)	Mallory-Head (714)	Allofit (783)	Duraloc (627)	ASR (572)
8	Fitmore (423)	Allofit (628)	Mallory-Head (728)	Mallory-Head (596)	Fitmore (489)
9	Secur-Fit (384)	Fitmore (604)	Pinnacle (535)	Fitmore (584)	Duraloc (444)
10	Allofit (351)	Option (450)	Fitmore (520)	Vitalock (572)	ABGII (443)
% using 10 most common	87.7%	86.8%	85.4%	84%	80.7%
Total N Procedures	8811	13183	14592	15784	16743
Total N Prosthesis Types	40	48	51	48	62

Figure HT7: 5 Most common Primary Conventional Total Acetabular Components used with Cementless Fixation

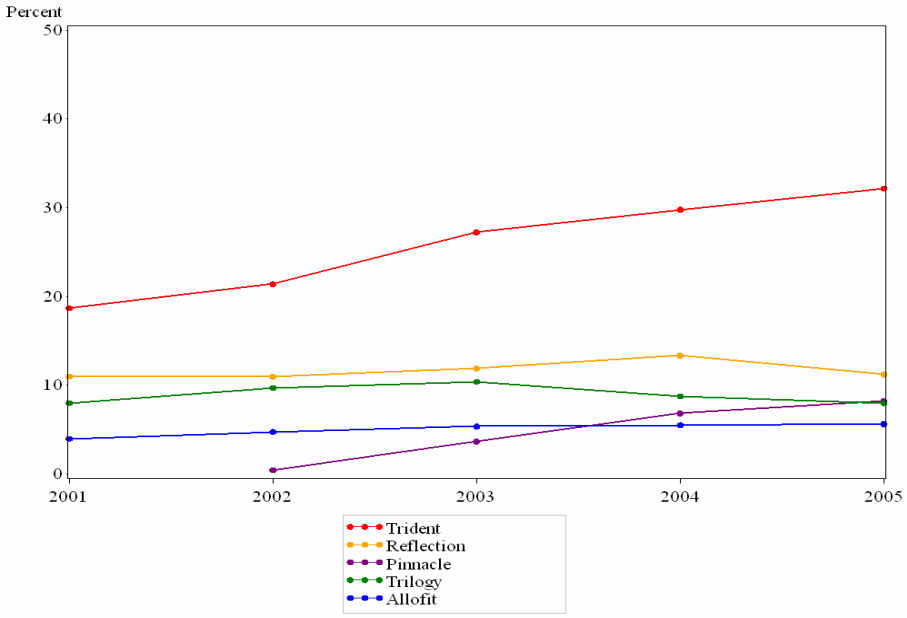


Table HT8: Resurfacing hip systems used in Primary Total Hips

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	BHR (643)	BHR (1344)	BHR (1353)	BHR (1211)	BHR (1153)
2	Cormet 2000 (21)	Cormet 2000 (59)	Cormet 2000 (80)	ASR (164)	ASR (296)
3	Conserve Plus (4)	Conserve Plus (3)	Durom (58)	Durom (161)	Durom (204)
4			ASR (43)	Cormet 2000 (89)	Cormet 2000 (84)
5			Conserve Plus (7)	Recap (27)	Adept (19)
6				Conserve Plus (18)	Icon (18)
7				Icon (4)	Conserve Plus (15)
8				Conserve (1)	Recap (14)
9					Bionik (12)
10					Conserve (2)
% using 10 most common	100%	100%	100%	100%	100%
Total N Procedures	668	1406	1541	1675	1817
Total N Prosthesis Types	3	3	5	8	10

Sex and Age

Table HT9: Usage of Primary Conventional Total Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	6006	53.5	5214	46.5	11220	100.0
2002	8694	55.0	7117	45.0	15811	100.0
2003	9507	55.8	7525	44.2	17032	100.0
2004	10090	56.0	7931	44.0	18021	100.0
2005	10465	55.9	8243	44.1	18708	100.0

Table HT10: Usage of Primary Resurfacing Total Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	214	32.0	454	68.0	668	100.0
2002	436	31.0	970	69.0	1406	100.0
2003	443	28.7	1098	71.3	1541	100.0
2004	467	27.9	1208	72.1	1675	100.0
2005	494	27.2	1323	72.8	1817	100.0

Table HT11: Usage of Primary Conventional Total Hip Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2001	1422	12.7	2412	21.5	3829	34.1	3000	26.7	557	5.0	11220	100.0
2002	1932	12.2	3380	21.4	5537	35.0	4228	26.7	734	4.6	15811	100.0
2003	1986	11.7	3734	21.9	5959	35.0	4545	26.7	808	4.7	17032	100.0
2004	1976	11.0	4081	22.6	6157	34.2	4948	27.5	859	4.8	18021	100.0
2005	2176	11.6	4299	23.0	6325	33.8	5032	26.9	876	4.7	18708	100.0

Table HT12: Usage of Primary Resurfacing Total Hip Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2001	346	51.8	251	37.6	65	9.7	6	0.9	0	0	668	100.0
2002	733	52.1	520	37.0	142	10.1	11	0.8	0	0	1406	100.0
2003	805	52.2	564	36.6	157	10.2	15	1.0	0	0	1541	100.0
2004	849	50.7	665	39.7	151	9.0	10	0.6	0	0	1675	100.0
2005	887	48.8	756	41.6	168	9.2	6	0.3	0	0	1817	100.0

Figure HT8: Trends in Prosthesis Fixation - Primary Conventional Total by State and Territory

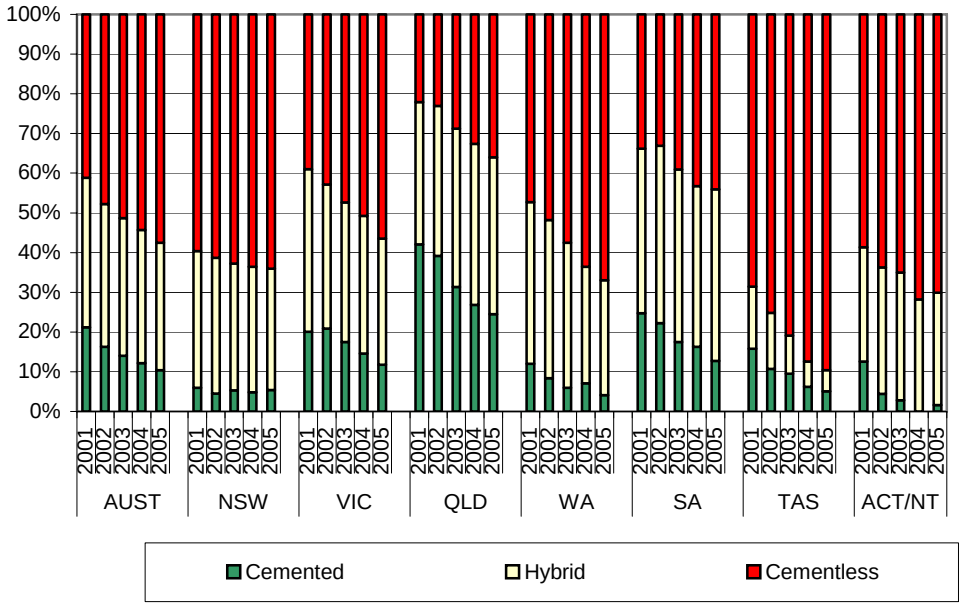
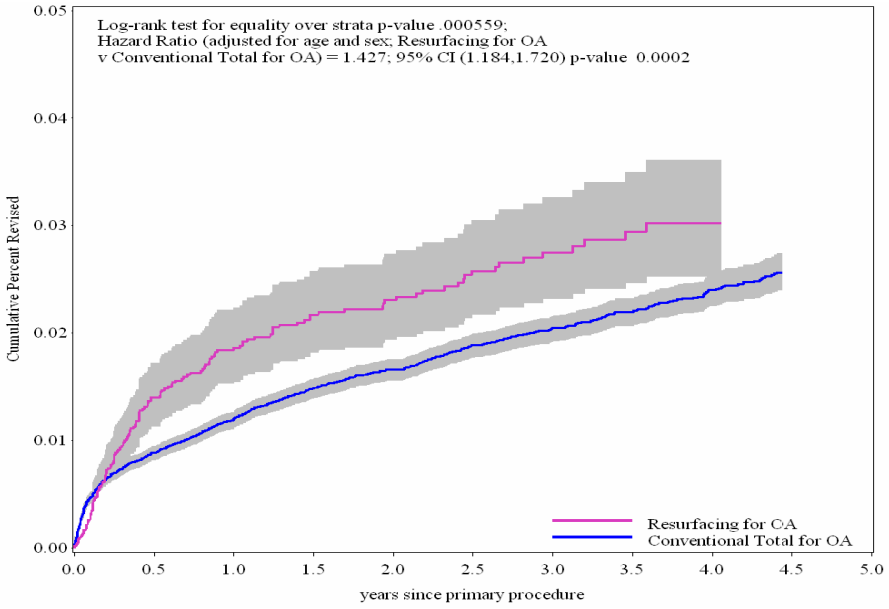


Table HT13: Conventional Total hip and Resurfacing hip requiring revision (primary diagnosis OA excluding revisions for infection

Type of procedure for Osteoarthritis excluding infection	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Resurfacing	148	6712	2.2	14069	1.1	(0.89, 1.24)
Conventional Total	1294	74609	1.7	173027	0.7	(0.71, 0.79)
Total	**1442**	**81321**	**1.8**	**187096**	**0.8**	**(0.73, 0.81)**

Figure HT9: Cumulative percentage revision of Conventional Total hip and Resurfacing hip for (Osteoarthritis excluding revisions for infection)



Type of Procedure	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Resurfacing	6712	5744	4874	4068	3329	2620	1932	1272	696	301	85
Conventional Total	74609	65396	56549	48259	40132	32695	25250	18442	11916	6818	3057

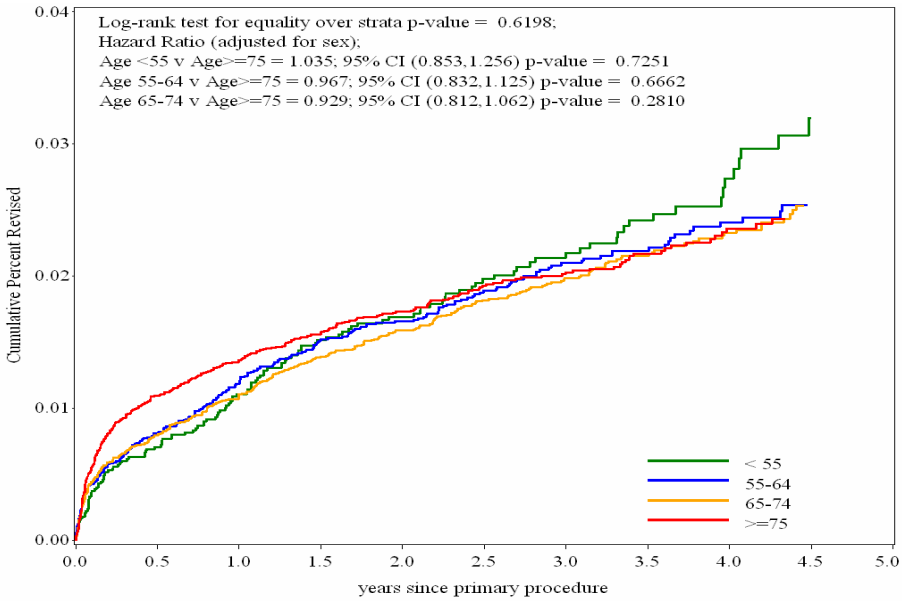
Table HT14: Yearly cumulative percentage revision of Conventional Total and Resurfacing hip (primary diagnosis OA excluding revisions for infection

Type of Procedure	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Resurfacing	1.86 (1.55, 2.23)	2.30 (1.94, 2.73)	2.75 (2.32, 3.26)	3.02 (2.53, 3.61)
Conventional Total	1.20 (1.12, 1.29)	1.66 (1.56, 1.76)	2.04 (1.92, 2.16)	2.40 (2.26, 2.55)

Table HT15 : Primary Conventional Total Hip Procedures Requiring Revision by Age (primary diagnosis OA excluding infection)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Age < 55	139	7324	1.9	17671	0.8	(0.66, 0.93)
Age 55-65	294	16894	1.7	39462	0.7	(0.66, 0.84)
Age 65-74	450	26860	1.7	63108	0.7	(0.65, 0.78)
Age >= 75	411	23531	1.7	52786	0.8	(0.71, 0.86)
Total.	**1294**	**74609**	**1.7**	**173027**	**0.7**	**(0.71, 0.79)**

Figure HT10: Cumulative percentage revision of Primary Conventional Total Hip Procedures by Age (primary diagnosis OA excluding infection)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Age <55	7324	6458	5631	4863	4140	3391	2714	2006	1323	729	365
Age 55-64	16894	14825	12799	10959	9082	7438	5746	4317	2815	1634	767
Age 65-74	26860	23705	20566	17620	14723	12035	9271	6744	4350	2541	1129
Age >=75	23531	20408	17553	14817	12187	9831	7519	5375	3428	1914	796

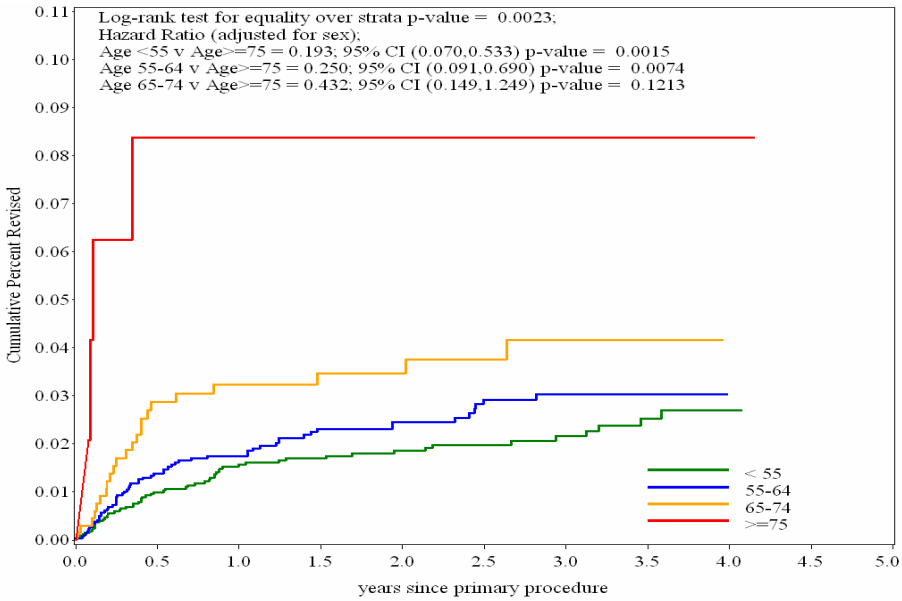
Table HT16: Yearly cumulative percentage revision of Primary Conventional Total Hip Procedures by Age (primary diagnosis OA excluding infection)

Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Age <55	1.10 (0.88, 1.39)	1.69 (1.39, 2.05)	2.17 (1.81, 2.61)	2.74 (2.26, 3.32)
Age 55-64	1.18 (1.02, 1.36)	1.66 (1.46, 1.88)	2.10 (1.85, 2.37)	2.40 (2.11, 2.73)
Age 65-74	1.10 (0.98, 1.24)	1.59 (1.43, 1.76)	1.99 (1.80, 2.19)	2.33 (2.10, 2.58)
Age >=75	1.36 (1.21, 1.52)	1.73 (1.56, 1.92)	2.01 (1.82, 2.23)	2.36 (2.11, 2.64)

Table HT17: Primary Resurfacing Hip Procedures Requiring Revision by Age (primary diagnosis OA excluding infection)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Age < 55	60	3298	1.8	7057	0.9	(0.65, 1.09)
Age 55-65	61	2695	2.3	5502	1.1	(0.85, 1.42)
Age 65-74	23	671	3.4	1398	1.6	(1.04, 2.47)
Age >= 75	4	48	8.3	112	3.6	(0.97, 9.15)
Total.	**148**	**6712**	**2.2**	**14069**	**1.1**	**(0.89, 1.24)**

Figure HT11: Cumulative percentage revision of Primary Resurfacing Hip Procedures by Age (primary diagnosis OA excluding infection)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Age <55	3298	2859	2436	2034	1690	1315	982	645	360	161	54
Age 55-64	2695	2273	1919	1592	1276	1016	739	488	267	117	27
Age 65-74	671	569	480	408	334	265	196	127	64	23	4
Age >=75	48	43	39	34	29	24	15	12	5		

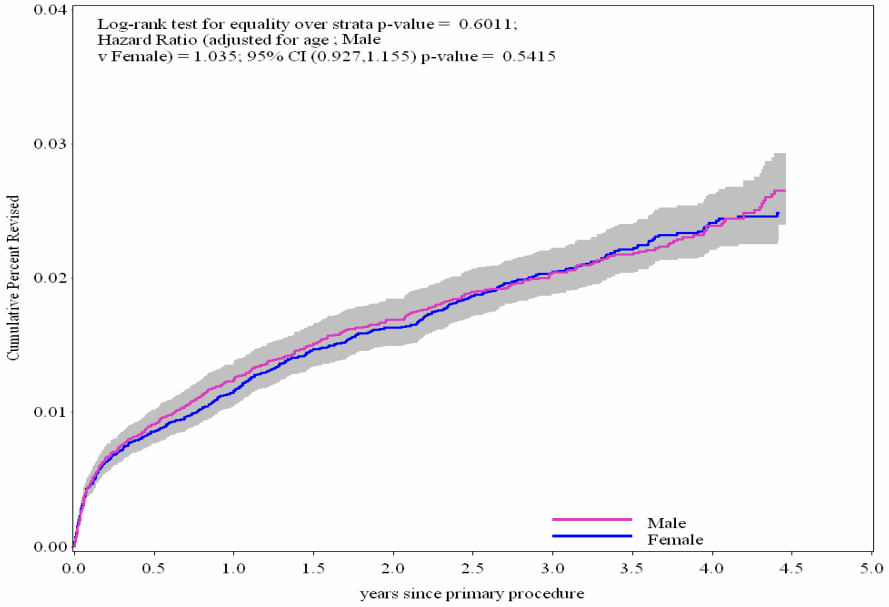
Table HT18: Yearly cumulative percentage revision of Primary Resurfacing Hip Procedures by Age (primary diagnosis OA and excluding infection as a reason for revision)

Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Age <55	1.57 (1.18, 2.09)	1.86 (1.41, 2.44)	2.16 (1.64, 2.84)	2.70 (2.01, 3.62)
Age 55-64	1.75 (1.30, 2.36)	2.46 (1.88, 3.21)	3.04 (2.33, 3.95)	
Age 65-74	3.24 (2.10, 4.98)	3.47 (2.27, 5.29)	4.16 (2.73, 6.32)	
Age >=75	8.38 (3.23, 20.81)	8.38 (3.23, 20.81)	8.38 (3.23, 20.81)	8.38 (3.23, 20.81)

Table HT19: Primary Conventional Total Hip Procedures Requiring Revision by Sex (primary diagnosis OA excluding infection)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	688	40316	1.7	92962	0.7	(0.69, 0.80)
Male	606	34293	1.8	80065	0.8	(0.70, 0.82)
Total	**1294**	**74609**	**1.7**	**173027**	**0.7**	**(0.71, 0.79)**

Figure HT12: Cumulative percentage revision of Primary Conventional Total Hip Procedures by Sex (primary diagnosis OA excluding infection)



Sex	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Female	40316	35326	30512	25963	21572	17488	13459	9749	6273	3587	1624
Male	34293	30070	26037	22296	18560	15207	11791	8693	5643	3231	1433

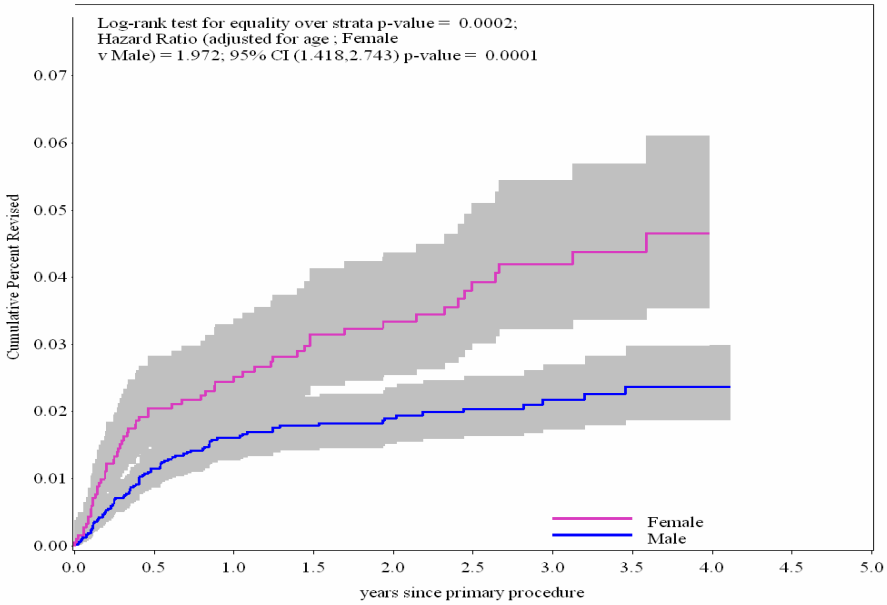
Table HT20: Yearly cumulative percentage revision of Primary Conventional Total Hip Procedures by Sex (primary diagnosis OA excluding infection)

Sex	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Female	1.16 (1.06, 1.28)	1.63 (1.50, 1.77)	2.04 (1.88, 2.21)	2.41 (2.21, 2.62)
Male	1.24 (1.13, 1.37)	1.69 (1.55, 1.85)	2.04 (1.88, 2.23)	2.39 (2.18, 2.62)

Table HT21: Primary Resurfacing Hip Procedures Requiring Revision by Sex (primary diagnosis OA excluding infection)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	62	1866	3.3	4028	1.5	(1.18, 1.97)
Male	86	4846	1.8	10041	0.9	(0.69, 1.06)
Total	**148**	**6712**	**2.2**	**14069**	**1.1**	**(0.89, 1.24)**

Figure HT13: Cumulative percentage revision of Primary Resurfacing Total Hip Procedures by Sex (primary diagnosis OA excluding infection)



Sex	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Female	1866	1596	1369	1154	966	765	576	389	221	96	27
Male	4846	4148	3505	2914	2363	1855	1356	883	475	205	58

Table HT22: Yearly cumulative percentage revision of Primary Resurfacing Hip Procedures by Sex (primary diagnosis OA excluding infection)

Sex	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Female	2.52 (1.87, 3.38)	3.34 (2.55, 4.36)	4.20 (3.23, 5.44)
Male	1.61 (1.27, 2.03)	1.90 (1.52, 2.37)	2.17 (1.74, 2.71)

Table HT23: Primary Conventional Total Hip Procedures Requiring Revision by Sex and Age (primary diagnosis OA excluding infection)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <55	71	3369	2.1	7913	0.9	(0.70, 1.13)
Female 55-64	142	8302	1.7	18947	0.7	(0.63, 0.88)
Female 65-74	240	13988	1.7	32689	0.7	(0.64, 0.83)
Female >= 75	235	14657	1.6	33412	0.7	(0.62, 0.80)
Males by Age						
Male <55	68	3955	1.7	9757	0.7	(0.54, 0.88)
Male 55-64	152	8592	1.8	20515	0.7	(0.63, 0.87)
Male 65-74	210	12872	1.6	30419	0.7	(0.60, 0.79)
Male >= 75	176	8874	2.0	19374	0.9	(0.78, 1.05)
Total	**1294**	**74609**	**1.7**	**173027**	**0.7**	**(0.71, 0.79)**

Figure HT14: Cumulative percentage revision of Primary Conventional Total Hip Procedures for females by Age (primary diagnosis OA excluding infection)

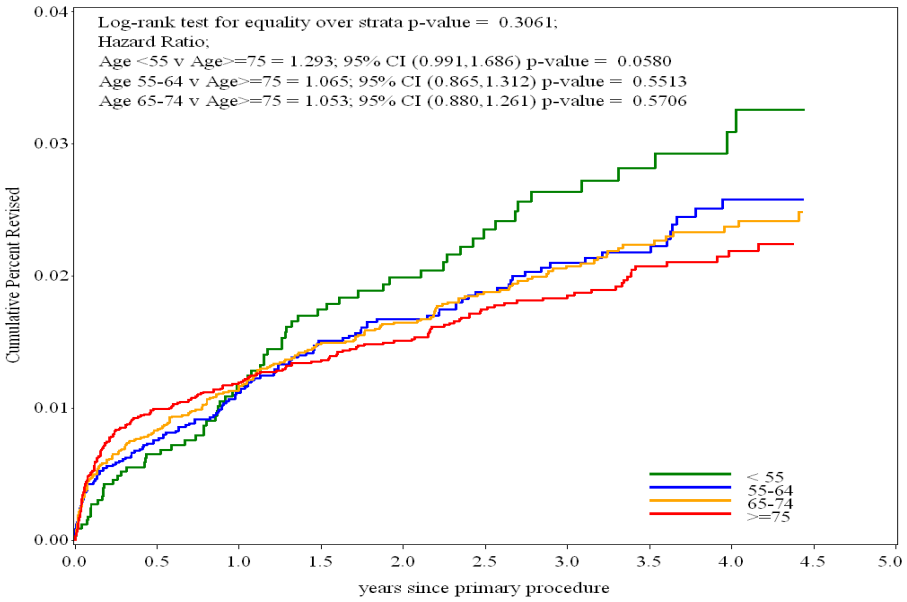
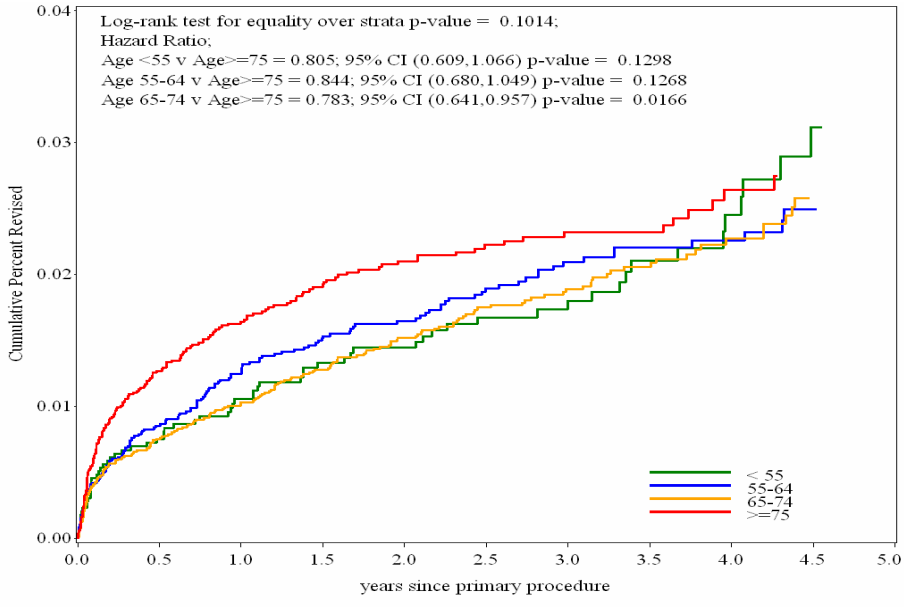


Figure HT15: Cumulative percentage revision of Primary Conventional Total Hip for males by Age (primary diagnosis OA excluding infection)



Sex and Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Females by Age											
Female <55	3369	2960	2544	2176	1848	1493	1188	882	572	307	147
Female 55-64	8302	7246	6222	5283	4325	3492	2682	1989	1291	751	375
Female 65-74	13988	12332	10679	9124	7640	6238	4778	3461	2196	1291	595
Female >= 75	14657	12788	11067	9380	7759	6265	4811	3417	2214	1238	507
Males by Age											
Male <55	3955	3498	3087	2687	2292	1898	1526	1124	751	422	218
Male 55-64	8592	7579	6577	5676	4757	3946	3064	2328	1524	883	392
Male 65-74	12872	11373	9887	8496	7083	5797	4493	3283	2154	1250	534
Male >= 75	8874	7620	6486	5437	4428	3566	2708	1958	1214	676	289

Table HT24: Yearly cumulative percentage revision of Primary Conventional Total Hip Procedures by Sex and Age (primary diagnosis OA excluding infection)

Sex and Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Females by Age				
Female <55	1.17 (0.84, 1.63)	1.99 (1.52, 2.60)	2.63 (2.05, 3.39)	3.09 (2.38, 4.01)
Female 55-64	1.12 (0.90, 1.38)	1.67 (1.39, 2.01)	2.10 (1.76, 2.51)	2.58 (2.13, 3.12)
Female 65-74	1.17 (0.99, 1.37)	1.65 (1.43, 1.90)	2.08 (1.81, 2.38)	2.37 (2.06, 2.73)
Female >= 75	1.19 (1.02, 1.39)	1.51 (1.31, 1.74)	1.83 (1.60, 2.10)	2.19 (1.89, 2.54)
Males by Age				
Male <55	1.05 (0.77, 1.44)	1.44 (1.09, 1.91)	1.80 (1.38, 2.35)	2.45 (1.85, 3.25)
Male 55-64	1.24 (1.02, 1.51)	1.64 (1.38, 1.96)	2.10 (1.77, 2.49)	2.26 (1.90, 2.68)
Male 65-74	1.03 (0.87, 1.23)	1.52 (1.30, 1.77)	1.89 (1.63, 2.19)	2.27 (1.95, 2.65)
Male >= 75	1.64 (1.39, 1.94)	2.10 (1.80, 2.45)	2.32 (1.99, 2.71)	2.64 (2.22, 3.14)

Table HT25: Primary Resurfacing Hip Procedures Requiring Revision by Sex and Age (primary diagnosis OA excluding infection)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <55	27	1022	2.6	2208	1.2	(0.81, 1.78)
Female 55-64	30	760	3.9	1634	1.8	(1.24, 2.62)
Female >=65	5	84	6.0	186	2.7	(0.87, 6.26)
Males by Age						
Male <55	33	2276	1.4	4849	0.7	(0.47, 0.96)
Male 55-64	31	1935	1.6	3868	0.8	(0.54, 1.14)
Male >=65	22	635	3.5	1323	1.7	(1.04, 2.52)
Total	**148**	**6712**	**2.2**	**14069**	**1.1**	**(0.89, 1.24)**

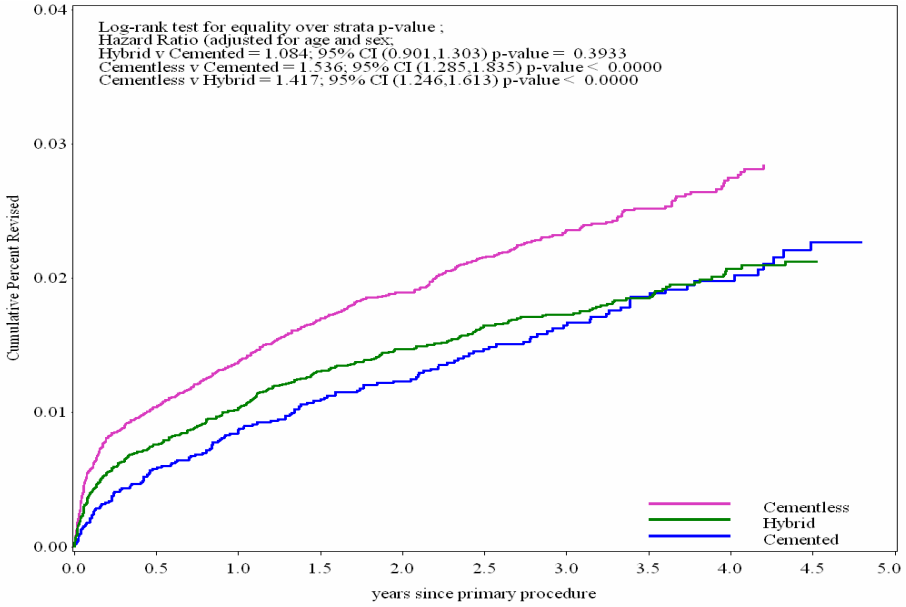
Table HT26: Yearly cumulative percentage revision of Primary Resurfacing Hip Procedures by Sex and Age (primary diagnosis OA excluding infection)

Sex and Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Females by Age				
Female <55	2.31 (1.51, 3.53)	2.62 (1.74, 3.93)	3.07 (2.05, 4.58)	3.91 (2.52, 6.04)
Female 55-64	2.65 (1.70, 4.13)	4.04 (2.75, 5.92)	5.21 (3.61, 7.51)	5.21 (3.61, 7.51)
Female >=65	3.85 (1.26, 11.48)	5.60 (2.11, 14.40)	8.38 (3.38, 19.98)	8.38 (3.38, 19.98)
Males by Age				
Male <55	1.24 (0.84, 1.83)	1.52 (1.05, 2.19)	1.75 (1.21, 2.53)	2.15 (1.45, 3.19)
Male 55-64	1.40 (0.94, 2.08)	1.81 (1.26, 2.62)	2.12 (1.46, 3.07)	
Male >= 65	3.55 (2.33, 5.41)	3.55 (2.33, 5.41)	3.86 (2.54, 5.84)	

Table HT27: Primary Conventional Total Hip Procedures requiring revision by Cement Fixation (primary diagnosis OA excluding infection)

Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	160	10490	1.5	28452	0.6	(0.48, 0.66)
Cementless	741	38236	1.9	82490	0.9	(0.83, 0.97)
Hybrid	393	25883	1.5	62085	0.6	(0.57, 0.70)
Total	**1294**	**74609**	**1.7**	**173027**	**0.7**	**(0.71, 0.79)**

Figure HT16: Cumulative percentage revision of Primary Conventional Total Hip Replacement by Fixation (primary diagnosis OA excluding infection)



Fixation	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Cemented	10490	9565	8658	7671	6700	5715	4657	3592	2519	1586	745
Cementless	38236	32871	27876	23370	18992	15097	11310	7981	4865	2585	1111
Hybrid	25883	22960	20015	17218	14440	11883	9283	6869	4532	2647	1201

Table HT28: Yearly cumulative percentage revision of Primary Conventional Total Hip Replacement by Fixation

Fixation	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Cemented	0.87 (0.70, 1.07)	1.23 (1.03, 1.48)	1.65 (1.39, 1.95)	1.98 (1.67, 2.34)
Cementless	1.41 (1.29, 1.54)	1.91 (1.77, 2.07)	2.38 (2.20, 2.57)	2.77 (2.54, 3.01)
Hybrid	1.03 (0.91, 1.17)	1.47 (1.32, 1.64)	1.74 (1.56, 1.93)	2.08 (1.86, 2.32)

Table HT29: Primary Conventional Total Hip Procedures requiring revision by cement fixation and age group (primary diagnosis OA excluding infection)

Age	*Fixation*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<55	Cemented	7	395	1.8	1147	0.6	(0.25, 1.26)
<55	Cementless	110	5724	1.9	13261	0.8	(0.68, 1.00)
<55	Hybrid	22	1205	1.8	3262	0.7	(0.42, 1.02)
55-64	Cemented	23	1280	1.8	3687	0.6	(0.40, 0.94)
55-64	Cementless	214	11561	1.9	25603	0.8	(0.73, 0.96)
55-64	Hybrid	57	4053	1.4	10173	0.6	(0.42, 0.73)
65-74	Cemented	58	3771	1.5	10429	0.6	(0.42, 0.72)
65-74	Cementless	239	13281	1.8	28562	0.8	(0.73, 0.95)
65-74	Hybrid	153	9808	1.6	24117	0.6	(0.54, 0.74)
>=75	Cemented	72	5044	1.4	13189	0.5	(0.43, 0.69)
>=75	Cementless	178	7670	2.3	15064	1.2	(1.01, 1.37)
>=75	Hybrid	161	10817	1.5	24533	0.7	(0.56, 0.77)
Total		**1294**	**74609**	**1.7**	**173027**	**0.7**	**(0.71, 0.79)**

Figure HT17: Cumulative percentage revision of Conventional Total Hip Replacement by cement status for patients aged <55 years (primary diagnosis OA excluding infection)

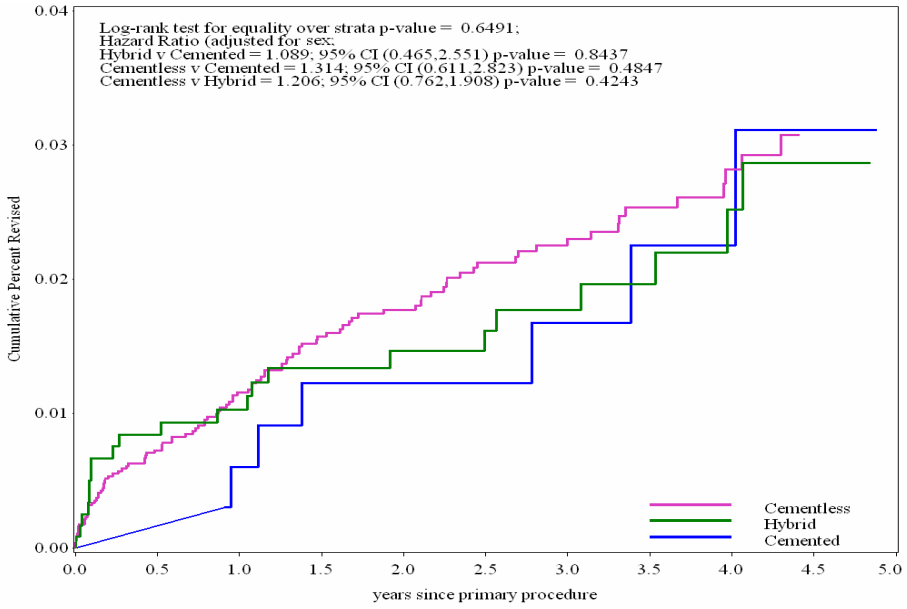


Figure HT18: Cumulative percentage revision of Conventional Total Hip Replacement by cement fixation for patients aged 55-64 years (primary diagnosis OA excluding infection)

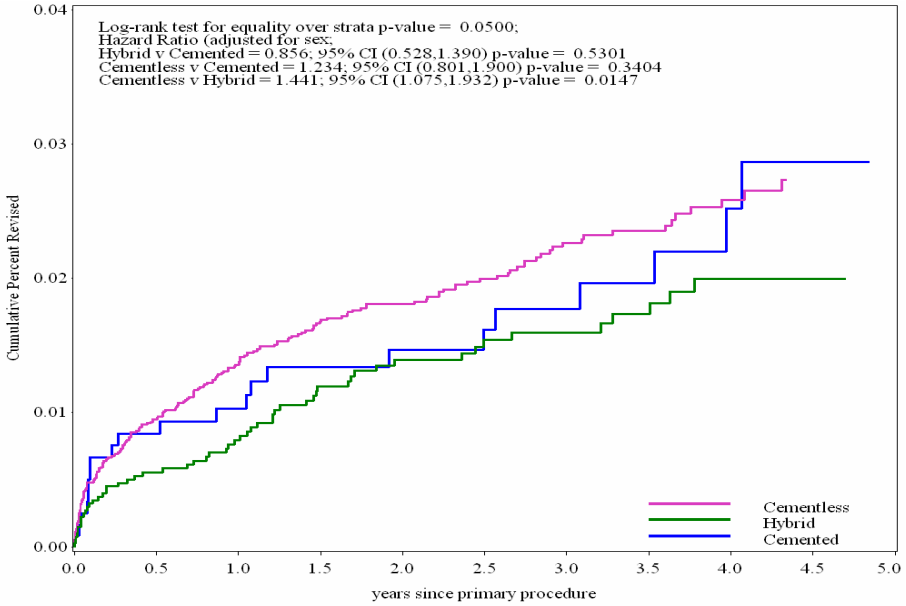


Figure HT19: Cumulative percentage revision of Conventional Total Hip Replacement by cement fixation for patients aged 65-74 years(primary diagnosis OA excluding infection)

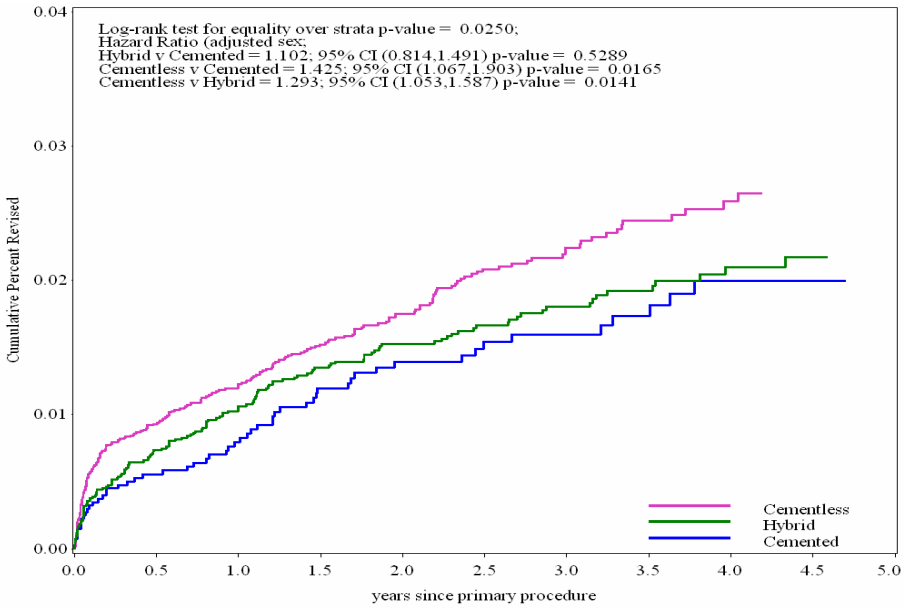


Figure HT20: Cumulative percentage revision of Conventional Total Hip Replacement by cement fixation for patients aged >=75 years (primary diagnosis OA excluding infection)

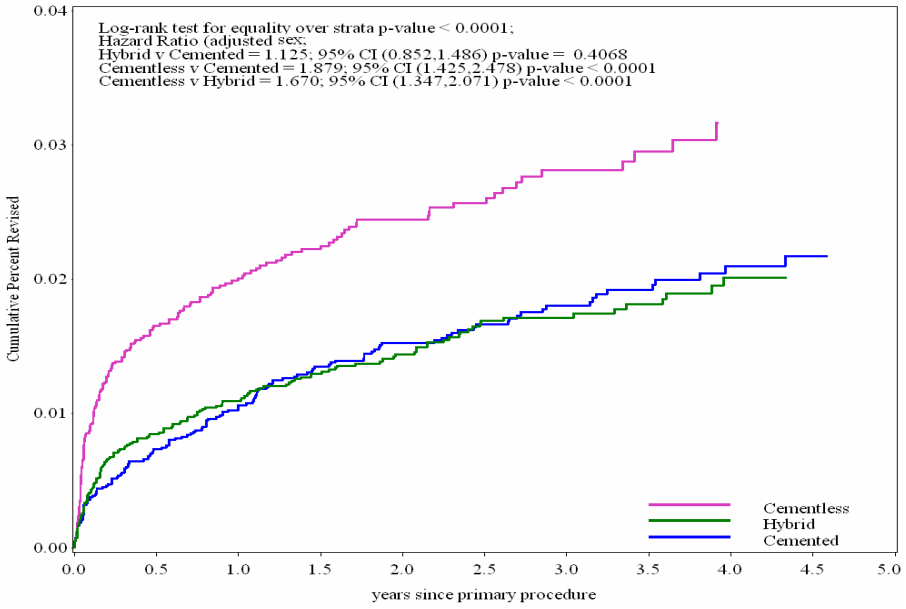


Table HT30: Yearly cumulative percentage revision of Conventional Primary Total Hip Replacement by Cement Fixation

Age	*Fixation*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
<55	Cemented	0.6 (2.39, 0.15)	1.23 (3.24, 0.46)	1.67 (4.02, 0.69)	2.25 (5.10, 0.99)
<55	Cementless	1.16 (1.49, 0.90)	1.77 (2.20, 1.43)	2.3 (2.82, 1.88)	2.82 (3.50, 2.27)
<55	Hybrid	1.03 (1.81, 0.59)	1.46 (2.39, 0.90)	1.77 (2.83, 1.11)	2.52 (4.04, 1.57)
55-64	Cemented	0.85 (0.46, 1.58)	1.15 (0.67, 1.97)	2.14 (1.39, 3.29)	2.14 (1.39, 3.29)
55-64	Cementless	1.35 (1.59, 1.15)	1.81 (2.09, 1.56)	2.26 (2.62, 1.95)	2.59 (3.02, 2.21)
55-64	Hybrid	0.79 (1.14, 0.56)	1.39 (1.86, 1.04)	1.59 (2.11, 1.20)	2 (2.65, 1.50)
65-74	Cemented	0.76 (0.52, 1.11)	1.18 (0.86, 1.62)	1.61 (1.21, 2.15)	2.04 (1.53, 2.70)
65-74	Cementless	1.23 (1.44, 1.05)	1.75 (2.02, 1.52)	2.24 (2.58, 1.95)	2.59 (3.00, 2.23)
65-74	Hybrid	1.06 (1.30, 0.87)	1.53 (1.81, 1.28)	1.8 (2.13, 1.52)	2.1 (2.50, 1.76)
>=75	Cemented	0.97 (0.73, 1.29)	1.29 (1.00, 1.67)	1.52 (1.18, 1.95)	1.86 (1.45, 2.39)
>=75	Cementless	2.01 (2.36, 1.71)	2.44 (2.85, 2.09)	2.81 (3.29, 2.40)	
>=75	Hybrid	1.09 (1.31, 0.91)	1.44 (1.71, 1.22)	1.71 (2.02, 1.45)	2.01 (2.40, 1.68)

Table HT31: Primary Conventional Total Hip Procedures where the Femoral and Acetabular components were used with Cement fixation requiring Revision

Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
C-Stem	Elite Plus LPW	1	285	0.4	684	0.1	(0.00, 0.81)
CPCS	Reflection	6	320	1.9	593	1.0	(0.37, 2.20)
CPT	ZCA	7	375	1.9	1130	0.6	(0.25, 1.28)
Charnley	Charnley	8	373	2.1	1040	0.8	(0.33, 1.52)
Charnley	Charnley Ogee	14	566	2.5	1495	0.9	(0.51, 1.57)
Elite Plus	Charnley Ogee	3	271	1.1	824	0.4	(0.08, 1.06)
Exeter	Contemporary	20	513	3.9	2136	0.9	(0.57, 1.45)
Exeter	Exeter	5	419	1.2	1827	0.3	(0.09, 0.64)
Exeter V40	Contemporary	54	3126	1.7	6015	0.9	(0.67, 1.17)
Exeter V40	Exeter	20	1088	1.8	2771	0.7	(0.44, 1.11)
MS 30	Low Profile Cup	4	513	0.8	1732	0.2	(0.06, 0.59)
Spectron EF	Reflection	12	1010	1.2	2818	0.4	(0.22, 0.74)
Other (205)	-	84	3635	2.3	9861	0.9	(0.68, 1.05)
Total		**238**	**12494**	**1.9**	**32928**	**0.7**	**(0.63, 0.82)**

Note: *some cementless components have been cemented*

Table HT32: Yearly cumulative percentage revision of where the Femoral and Acetabular components were used with Cement fixation

Femoral Component	*Acetabular Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
C-Stem	Elite Plus LPW	0.41 (0.06, 2.90)	0.41 (0.06, 2.90)	0.41 (0.06, 2.90)	
CPCS	Reflection	1.38 (0.52, 3.65)	1.86 (0.77, 4.47)	2.81 (1.16, 6.71)	
CPT	ZCA	0.81 (0.26, 2.50)	0.81 (0.26, 2.50)	2.12 (0.94, 4.77)	2.70 (1.26, 5.74)
Charnley	Charnley	0.93 (0.30, 2.85)	1.67 (0.69, 3.97)	2.14 (0.96, 4.77)	3.52 (1.70, 7.20)
Charnley	Charnley Ogee	1.33 (0.64, 2.77)	2.04 (1.10, 3.78)	2.34 (1.29, 4.23)	2.85 (1.56, 5.15)
Elite Plus	Charnley Ogee	1.15 (0.37, 3.53)	1.15 (0.37, 3.53)	1.15 (0.37, 3.53)	1.15 (0.37, 3.53)
Exeter	Contemporary	1.80 (0.94, 3.43)	2.84 (1.69, 4.75)	3.72 (2.36, 5.84)	3.72 (2.36, 5.84)
Exeter	Exeter	0.98 (0.37, 2.58)	1.23 (0.51, 2.93)	1.23 (0.51, 2.93)	1.23 (0.51, 2.93)
Exeter V40	Contemporary	1.29 (0.94, 1.78)	1.89 (1.42, 2.50)	2.22 (1.68, 2.95)	
Exeter V40	Exeter	0.89 (0.46, 1.71)	1.37 (0.80, 2.36)	2.19 (1.37, 3.50)	2.84 (1.75, 4.58)
MS 30	Low Profile Cup	0.40 (0.10, 1.58)	0.40 (0.10, 1.58)	0.73 (0.23, 2.32)	1.20 (0.42, 3.38)
Spectron EF	Reflection	0.62 (0.28, 1.38)	0.76 (0.36, 1.59)	1.45 (0.79, 2.65)	1.67 (0.93, 3.00)
Other (205)		1.20 (0.88, 1.63)	1.93 (1.50, 2.48)	2.43 (1.91, 3.07)	2.98 (2.37, 3.76)

Table HT33: Primary Conventional Total Hip where the Femoral and Acetabular components were used with Cementless Fixation requiring Revision

Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
ABGII	ABGII	69	2396	2.9	6193	1.1	(0.87, 1.41)
ABGII	ABGII (shell & insert)	7	544	1.3	915	0.8	(0.31, 1.58)
ABGII	Trident	23	876	2.6	1756	1.3	(0.83, 1.96)
Accolade	Trident	39	1765	2.2	2343	1.7	(1.18, 2.28)
Alloclassic	Allofit	20	848	2.4	1209	1.7	(1.01, 2.56)
Alloclassic	Fitmore	16	482	3.3	701	2.3	(1.30, 3.71)
Alloclassic SL	Allofit	18	1285	1.4	2996	0.6	(0.36, 0.95)
Alloclassic SL	Fitmore	12	538	2.2	1465	0.8	(0.42, 1.43)
Alloclassic SL	Morscher	7	313	2.2	1018	0.7	(0.28, 1.42)
CLS	Allofit	5	381	1.3	818	0.6	(0.20, 1.43)
CLS	Fitmore	12	404	3.0	1168	1.0	(0.53, 1.79)
Citation	Trident	12	518	2.3	956	1.3	(0.65, 2.19)
Citation	Vitalock	10	530	1.9	1597	0.6	(0.30, 1.15)
Corail	ASR	1	315	0.3	141	0.7	(0.02, 3.95)
Corail	Duraloc	13	643	2.0	1340	1.0	(0.52, 1.66)
Corail	Pinnacle	15	875	1.7	896	1.7	(0.94, 2.76)
Epoch	Trilogy	6	313	1.9	507	1.2	(0.43, 2.57)
F2L Multineck	SPH-Blind	26	597	4.4	1649	1.6	(1.03, 2.31)
Mallory-Head	M2a	4	255	1.6	367	1.1	(0.30, 2.79)
Mallory-Head	Mallory-Head	29	1441	2.0	4041	0.7	(0.48, 1.03)
Meridian	Vitalock	10	383	2.6	1057	0.9	(0.45, 1.74)
Natural Hip	Fitmore	10	680	1.5	1688	0.6	(0.28, 1.09)
Omnifit	Secur-Fit	23	492	4.7	1528	1.5	(0.95, 2.26)
Omnifit	Trident	20	806	2.5	2394	0.8	(0.51, 1.29)
S-Rom	Option	11	654	1.7	1778	0.6	(0.31, 1.11)
S-Rom	Pinnacle	9	634	1.4	849	1.1	(0.48, 2.01)
SL-Plus	EPF-Plus	10	551	1.8	564	1.8	(0.85, 3.26)
Secur-Fit	Trident	41	2027	2.0	4631	0.9	(0.64, 1.20)
Secur-Fit Plus	Trident	54	2967	1.8	6823	0.8	(0.59, 1.03)
Stability	Duraloc	8	399	2.0	1236	0.6	(0.28, 1.28)
Summit	ASR	0	263	0.0	155	0.0	(0.00, 2.39)
Summit	Pinnacle	10	836	1.2	1106	0.9	(0.43, 1.66)
Synergy	Reflection	91	4440	2.0	9109	1.0	(0.80, 1.23)
Taperloc	M2a	6	280	2.1	451	1.3	(0.49, 2.90)
Taperloc	Mallory-Head	10	565	1.8	1235	0.8	(0.39, 1.49)
VerSys	Trilogy	64	2579	2.5	5734	1.1	(0.86, 1.43)
Other (476)	-	257	9062	2.8	20190	1.3	(1.12, 1.44)
Total		**978**	**42937**	**2.3**	**92605**	**1.1**	**(0.99, 1.12)**

Table HT34: Yearly cumulative percentage revision of where the Femoral and Acetabular components were used with Cementless Fixation

Femoral Component	*Acetabular Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
ABGII	ABGII	1.76 (1.30, 2.39)	2.53 (1.94, 3.29)	3.12 (2.43, 4.00)	3.57 (2.73, 4.67)
ABGII	ABGII (shell & insert)	1.14 (0.51, 2.53)	1.45 (0.68, 3.07)		
ABGII	Trident	1.86 (1.12, 3.07)	3.07 (2.01, 4.66)	3.29 (2.17, 4.96)	
Accolade	Trident	1.86 (1.27, 2.73)	3.02 (2.14, 4.26)		
Alloclassic	Allofit	2.58 (1.67, 3.98)	2.58 (1.67, 3.98)		
Alloclassic	Fitmore	3.43 (2.08, 5.64)	3.76 (2.31, 6.10)		
Alloclassic SL	Allofit	1.14 (0.66, 1.96)	1.50 (0.92, 2.46)	1.77 (1.11, 2.81)	1.77 (1.11, 2.81)
Alloclassic SL	Fitmore	1.55 (0.78, 3.09)	1.80 (0.94, 3.44)	2.42 (1.33, 4.39)	2.87 (1.59, 5.15)
Alloclassic SL	Morscher	1.33 (0.50, 3.50)	2.38 (1.14, 4.93)	2.38 (1.14, 4.93)	2.38 (1.14, 4.93)
CLS	Allofit	1.16 (0.43, 3.06)	1.16 (0.43, 3.06)	1.78 (0.70, 4.50)	
CLS	Fitmore	1.78 (0.85, 3.71)	2.11 (1.06, 4.18)	3.71 (2.09, 6.55)	3.71 (2.09, 6.55)
Citation	Trident	2.16 (1.16, 4.00)	2.51 (1.38, 4.54)	2.51 (1.38, 4.54)	2.51 (1.38, 4.54)
Citation	Vitalock	0.38 (0.10, 1.51)	1.00 (0.42, 2.39)	2.29 (1.18, 4.44)	2.86 (1.48, 5.49)
Corail*****	ASR*****				
Corail	Duraloc	1.68 (0.91, 3.11)	2.13 (1.21, 3.75)	2.49 (1.42, 4.34)	
Corail	Pinnacle	1.85 (1.09, 3.14)	2.11 (1.25, 3.56)		
Epoch	Trilogy	2.05 (0.93, 4.52)	2.05 (0.93, 4.52)	2.05 (0.93, 4.52)	
F2L Multineck	SPH-Blind	2.72 (1.67, 4.40)	3.66 (2.40, 5.57)	4.81 (3.24, 7.13)	5.30 (3.55, 7.87)
Mallory-Head	M2a	0.82 (0.20, 3.22)	2.08 (0.77, 5.58)		
Mallory-Head	Mallory-Head	1.43 (0.93, 2.21)	1.62 (1.06, 2.45)	1.73 (1.15, 2.61)	2.26 (1.50, 3.39)
Meridian	Vitalock	1.10 (0.41, 2.90)	2.05 (0.98, 4.26)	3.04 (1.55, 5.92)	3.71 (1.93, 7.07)
Natural Hip	Fitmore	1.21 (0.60, 2.40)	1.43 (0.74, 2.75)	1.43 (0.74, 2.75)	2.04 (0.97, 4.27)
Omnifit	Secur-Fit	2.66 (1.55, 4.54)	3.37 (2.08, 5.45)	4.91 (3.20, 7.49)	5.70 (3.77, 8.58)
Omnifit	Trident	1.51 (0.86, 2.65)	1.66 (0.97, 2.85)	2.58 (1.62, 4.09)	2.58 (1.62, 4.09)
S-Rom	Option	1.43 (0.75, 2.73)	1.84 (1.02, 3.30)	1.84 (1.02, 3.30)	1.84 (1.02, 3.30)
S-Rom	Pinnacle	1.49 (0.73, 3.00)	1.49 (0.73, 3.00)		
SL-Plus	EPF-Plus	1.76 (0.86, 3.58)	2.18 (1.10, 4.30)		
Secur-Fit	Trident	1.38 (0.94, 2.02)	2.12 (1.52, 2.94)	2.31 (1.67, 3.19)	2.85 (2.03, 3.99)
Secur-Fit Plus	Trident	1.30 (0.94, 1.79)	1.92 (1.44, 2.54)	1.98 (1.49, 2.62)	2.25 (1.67, 3.03)
Stability	Duraloc	0.75 (0.24, 2.31)	1.83 (0.88, 3.81)	2.22 (1.11, 4.43)	2.22 (1.11, 4.43)
Summit	Pinnacle	1.33 (0.69, 2.58)	1.61 (0.84, 3.05)		
Synergy	Reflection	1.47 (1.15, 1.89)	2.13 (1.71, 2.66)	2.56 (2.05, 3.20)	
Taperloc	M2a	1.20 (0.39, 3.69)	2.38 (0.98, 5.73)		
Taperloc	Mallory-Head	1.69 (0.88, 3.23)	1.94 (1.04, 3.59)	1.94 (1.04, 3.59)	1.94 (1.04, 3.59)
VerSys	Trilogy	2.06 (1.57, 2.70)	2.50 (1.94, 3.23)	2.76 (2.14, 3.55)	
Other (476)	-	2.15 (1.85, 2.49)	2.73 (2.38, 3.13)	3.45 (3.02, 3.94)	4.06 (3.52, 4.67)

Note: *******Corail ASR 10% not at risk at one year*

Table HT35: Hybrid - Primary Conventional Total Hip where the Femoral component was Cemented and the Acetabular component was Cementless requiring Revision

Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
C-Stem	Duraloc	25	784	3.2	1864	1.3	(0.87, 1.98)
CPCS	Reflection	9	770	1.2	1265	0.7	(0.33, 1.35)
CPT	Trilogy	33	1864	1.8	4358	0.8	(0.52, 1.06)
Charnley	Vitalock	12	377	3.2	1233	1.0	(0.50, 1.70)
Definition	Vitalock	1	359	0.3	1447	0.1	(0.00, 0.38)
Elite Plus	Duraloc	35	1043	3.4	3349	1.0	(0.73, 1.45)
Elite Plus	Pinnacle	3	280	1.1	372	0.8	(0.17, 2.35)
Exeter	Mallory-Head	3	332	0.9	1067	0.3	(0.06, 0.82)
Exeter	Vitalock	32	1218	2.6	5419	0.6	(0.40, 0.83)
Exeter V40	ABGII	13	933	1.4	2507	0.5	(0.28, 0.89)
Exeter V40	Mallory-Head	7	557	1.3	1274	0.5	(0.22, 1.13)
Exeter V40	Trident	114	7563	1.5	12022	0.9	(0.78, 1.14)
Exeter V40	Vitalock	26	1752	1.5	4353	0.6	(0.39, 0.88)
Freeman	Mallory-Head	10	308	3.2	1008	1.0	(0.48, 1.82)
MS 30	Allofit	10	486	2.1	1211	0.8	(0.40, 1.52)
MS 30	Fitmore	2	295	0.7	1059	0.2	(0.02, 0.68)
Omnifit	Secur-Fit	10	262	3.8	982	1.0	(0.49, 1.87)
Omnifit	Trident	34	1097	3.1	2775	1.2	(0.85, 1.71)
Spectron EF	Reflection	64	2644	2.4	6730	1.0	(0.73, 1.21)
VerSys	Trilogy	9	534	1.7	1369	0.7	(0.30, 1.25)
Other (285)	-	139	5695	2.4	13790	1.0	(0.85, 1.19)
Total		**591**	**29153**	**2.0**	**69454**	**0.9**	**(0.78, 0.92)**

Note: *some cementless components have been cemented*

Table HT36 Yearly cumulative percentage revision of Hybrid - Primary Conventional Total Hip where the Femoral component was Cemented and the Acetabular component was Cementless

Femoral Component	*Acetabular Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
C-Stem	Duraloc	2.66 (1.70, 4.14)	3.63 (2.44, 5.41)	3.63 (2.44, 5.41)	4.33 (2.74, 6.83)
CPCS	Reflection	1.14 (0.57, 2.27)	1.14 (0.57, 2.27)	1.66 (0.76, 3.60)	
CPT	Trilogy	1.29 (0.86, 1.94)	1.89 (1.33, 2.70)	2.11 (1.49, 2.98)	2.11 (1.49, 2.98)
Charnley	Vitalock	1.90 (0.91, 3.95)	2.82 (1.52, 5.18)	3.21 (1.78, 5.75)	3.76 (2.11, 6.66)
Definition	Vitalock	0.28 (0.04, 1.97)	0.28 (0.04, 1.97)	0.28 (0.04, 1.97)	0.28 (0.04, 1.97)
Elite Plus	Duraloc	1.98 (1.28, 3.05)	2.77 (1.91, 4.02)	3.42 (2.42, 4.81)	3.89 (2.75, 5.48)
Elite Plus	Pinnacle	1.25 (0.40, 3.86)	1.25 (0.40, 3.86)		
Exeter	Mallory-Head	0.60 (0.15, 2.39)	0.60 (0.15, 2.39)	0.60 (0.15, 2.39)	1.34 (0.39, 4.56)
Exeter	Vitalock	1.57 (1.00, 2.45)	2.07 (1.41, 3.05)	2.33 (1.62, 3.36)	2.52 (1.77, 3.58)
Exeter V40	ABGII	1.10 (0.59, 2.03)	1.23 (0.68, 2.22)	1.40 (0.79, 2.47)	1.69 (0.95, 3.00)
Exeter V40	Mallory-Head	0.82 (0.31, 2.17)	1.32 (0.59, 2.93)	1.72 (0.80, 3.67)	1.72 (0.80, 3.67)
Exeter V40	Trident	1.29 (1.04, 1.59)	1.77 (1.45, 2.15)	2.12 (1.71, 2.63)	
Exeter V40	Vitalock	0.95 (0.59, 1.55)	1.37 (0.90, 2.08)	1.56 (1.04, 2.33)	
Freeman	Mallory-Head	2.30 (1.10, 4.76)	3.42 (1.85, 6.28)	3.42 (1.85, 6.28)	3.42 (1.85, 6.28)
MS 30	Allofit	1.68 (0.84, 3.33)	1.97 (1.03, 3.77)	2.35 (1.25, 4.40)	2.35 (1.25, 4.40)
MS 30	Fitmore	. (0.00, .)	. (0.00, .)	0.41 (0.06, 2.90)	0.41 (0.06, 2.90)
Omnifit	Secur-Fit	0.78 (0.20, 3.08)	2.43 (1.10, 5.33)	2.90 (1.39, 5.99)	2.90 (1.39, 5.99)
Omnifit	Trident	2.32 (1.56, 3.44)	3.07 (2.15, 4.38)	3.72 (2.65, 5.21)	3.72 (2.65, 5.21)
Spectron EF	Reflection	1.40 (1.00, 1.94)	2.31 (1.76, 3.03)	2.67 (2.05, 3.47)	3.34 (2.54, 4.39)
VerSys	Trilogy	1.38 (0.66, 2.88)	1.89 (0.98, 3.63)	1.89 (0.98, 3.63)	1.89 (0.98, 3.63)
Other (285)	-	1.73 (1.41, 2.11)	2.36 (1.97, 2.82)	2.86 (2.40, 3.39)	3.49 (2.92, 4.16)

Table HT37: Resurfacing Hip systems requiring revision

Resurfacing Head	*Resurfacing Cup*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
ASR	ASR	18	503	3.6	446	4.0	(2.39, 6.38)
Adept	Adept	0	19	0.0	3	0.0	(0.00, 129.6)
BHR	BHR	126	5799	2.2	13487	0.9	(0.78, 1.11)
Bionik	Bionik	0	12	0.0	3	0.0	(0.00, 143.3)
Conserve	-	2	2	100.0	3	74.1	(8.97, 267.6)
Conserve	Conserve Plus	0	3	0.0	2	0.0	(0.00, 164.9)
Conserve Plus	Conserve Plus	2	48	4.2	82	2.4	(0.29, 8.79)
Cormet 2000	Cormet 2000	14	333	4.2	649	2.2	(1.18, 3.62)
Durom	Durom	12	423	2.8	451	2.7	(1.38, 4.65)
Icon	Icon	1	22	4.5	13	7.5	(0.19, 42.05)
Recap	Recap	2	41	4.9	41	4.9	(0.59, 17.56)
Total		**177**	**7205**	**2.5**	**15179**	**1.2**	**(1.00, 1.35)**

Table HT38: Yearly cumulative percentage revision of Resurfacing Hip systems

Resurfacing Head	*Resurfacing Cup*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
ASR	ASR	4.19 (2.56, 6.83)			
Adept	Adept				
BHR	BHR	1.62 (1.32, 2.00)	2.13 (1.76, 2.57)	2.62 (2.18, 3.14)	2.92 (2.41, 3.55)
Bionik	Bionik				
Conserve	-	50.0 (8.96, 99.40)			
Conserve	Conserve Plus	. (0.00, .)			
Conserve Plus	Conserve Plus	2.08 (0.30, 13.88)	2.08 (0.30, 13.88)	2.08 (0.30, 13.88)	
Cormet 2000	Cormet 2000	3.22 (1.74, 5.91)	3.72 (2.06, 6.66)	6.37 (3.53, 11.36)	
Durom	Durom	3.36 (1.85, 6.07)	3.93 (2.19, 6.99)		
Icon	Icon	5.56 (0.80, 33.36)			
Recap	Recap	5.75 (1.45, 21.36)			

Primary Conventional Total Hip Replacement Prostheses with a higher than anticipated revision rate

Table HT39: Individual Primary Conventional Total Hip Prostheses with higher than anticipated revision rates either alone or in combination

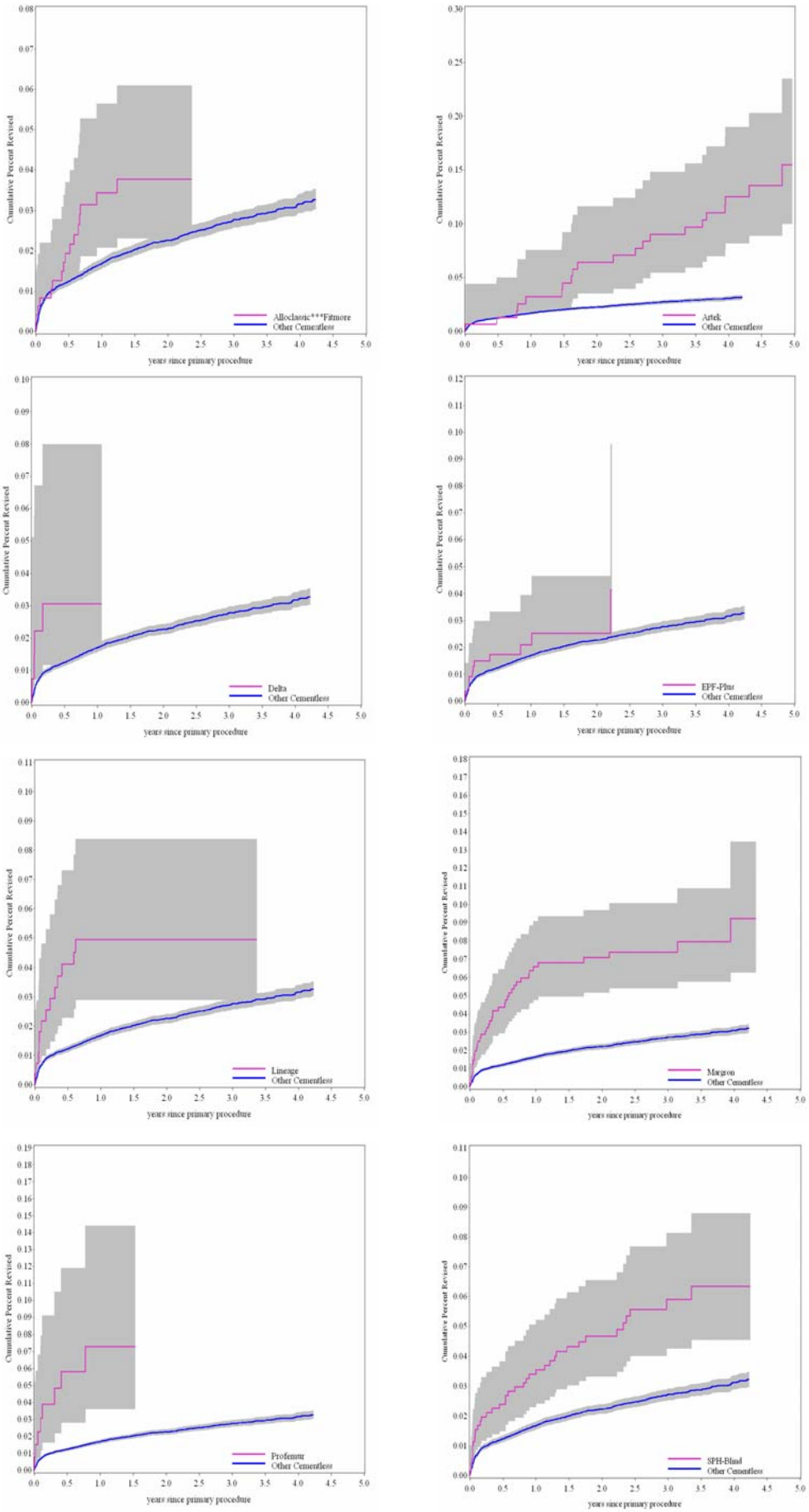
Femoral Component	*Acetabular Component*	*Hazard Ratio*	*P Value*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cementless								
Alloclassic	Fitmore	2.16	0.004	482	3.3	701	2.3	(1.2, 3.4)
Esop	Altas	2.93	0.020	81	4.9	96	4.2	(0.1, 8.2)
Margron	*	3.01	<0.001	563	7.3	1289	3.2	(2.2.4.2)
Profemur	*	7.39	<0.001	134	6.0	103	7.8	(2.4,13.2)
Revitan	*	2.57	0.048	83	6.0	184	2.7	(0.3, 5.1)
**	Artek	3.40	<0.001	158	15.2	667	3.6	(2.2,5.0)
**	Delta	4.78	0.011	136	2.9	79	5.0	(0.1, 10.0)
**	EDF-Plus	2.00	0.020	560	2.1	567	2.1	(0.9, 3.3)
**	Inter-Op	5.13	0.001	27	22.2	111	5.4	(1.1,9.8)
**	Lineage	2.50	0.003	276	4.7	492	2.6	(1.2,4.1)
**	SPH Blind	2.12	<0.001	714	5.3	1897	2.0	(1.42, 2.75)
Cemented								
Elite Plus	Apollo	3.58	0.014	52	9.6	193	2.6	(0.3,4.9)
Elite Plus	Charnley LPW	3.09	0.009	89	7.9	313	2.2	(0.6,3.9)
H Moos	Mueller	14.62	<0.001	19	36.8	66	10.6	(2.7,18.4)

Note: *cementless components have been compared to all other cementless components*
cemented components have been compared to all other cemented components
**= includes all models of acetabular components used with the listed femoral component,*
***= includes all models of femoral components used with the listed acetabluar component*

Table HT40: Yearly cumulative percentage revision of individual primary conventional total hip prostheses that have been identified as having a higher than anticipated revision rate.

Femoral Component	*Acetabular Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
Cementless					
Alloclassic	Fitmore	3.43 (2.08, 5.64)	3.76 (2.31, 6.10)	3.76 (2.31, 6.10)	3.76 (2.31, 6.10)
Esop	Altas	4.99 (1.90, 12.74)			
Margron	*	6.60 (4.78, 9.08)	7.09 (5.18, 9.68)	7.40 (5.42, 10.07)	9.23 (6.29, 13.45)
Profemur	*	7.30 (3.63, 14.40)			
Revitan	*	2.44 (0.62, 9.40)	6.41 (2.71, 14.75)		
**	Artek	3.21 (1.35, 7.55)	6.44 (3.52, 11.64)	9.04 (5.46, 14.79)	12.6 (8.19, 19.00)
**	Delta	3.07 (1.16, 7.98)			
**	EDF-Plus	2.10 (1.11, 3.95)	2.51 (1.35, 4.65)		
**	Inter-Op	11.1 (3.73, 30.61)	11.1 (3.73, 30.61)	14.8 (5.83, 34.80)	18.7 (8.23, 39.24)
**	Lineage	4.95 (2.90, 8.38)	4.95 (2.90, 8.38)	4.95 (2.90, 8.38)	
**	SPH Blind	3.55 (2.42, 5.21)	4.67 (3.32, 6.55)	5.90 (4.26, 8.13)	6.34 (4.56, 8.79)
Cemented					
Elite Plus	Apollo	2.00 (0.28, 13.36)	4.00 (1.02, 15.06)	4.00 (1.02, 15.06)	6.59 (2.15, 19.27)
Elite Plus	Charnley LPW	1.20 (0.17, 8.25)	4.86 (1.85, 12.44)	6.12 (2.59, 14.07)	9.10 (4.42, 18.22)
H Moos	Mueller	5.56 (0.80, 33.36)	11.1 (2.90, 37.58)	33.3 (16.57, 59.65)	39.4 (21.04, 65.41)

Figures HT21-28: Cumulative percentage revision of individual primary conventional total hip prostheses that have been identified as having a higher than anticipated revision rate.



Revision Hip Replacement

This report is based on the analysis of 16,672 revision hip operations recorded by the registry with a procedure date prior to the end of 2005.

It is important to appreciate that the Registry has information on two groups of revision procedures. There are those where the Registry has the primary procedure recorded and therefore has a full chronological list of procedures that have occurred subsequent to the primary procedure. Currently this is 3,001 revision procedures or 18.0% of all revisions. Theses procedures however include all revisions of a known primary total hip. For some of these primary total hips there have been multiple revisions. The number of known primary procedures that have been revised at least once is 1817.

The remainder of the revisions are revision procedures where the primary procedure was undertaken prior to the establishment of the Registry. The Registry may have information on a previous revision procedure(s) for some of theses. Unlike the first group of revisions however the Registry does not have a full chronological list of all procedures commencing with the original primary procedure.

This presents particular difficulties in the analysis because in this later group it is not possible to know how many times a procedure has been revised prior to the Registry receiving data on the initial revision procedure. In order to accurately determine the outcomes of revision surgery it is necessary to know the nature of the primary procedure in particular the patient characteristics, the prostheses used and the reason for the primary procedure. Currently the Registry has this information on only a small proportion of the total number of revision procedures that it has recorded. Despite this significant limitation some information can be gained by analysis of the revision procedures.

Use of different Types of Revisions

All revisions.
The majority of all revision procedures recorded by the Registry are major revisions (14,178 or 85%). These are revisions where either or both the acetabular and femoral components are revised. There are a number of different types of major revision, major partial and major total. Major partial revisions account for 58.4% of all major revisions (37.2% acetabular only and 21.2% femoral only).

Revision of both the acetabular and femoral components (Major total revision) occur in 36.3% of major revisions. There are a small number of major revisions where the original prosthesis is reinserted (0.2%), procedures where components are completely removed (1.4%) and where a cement spacer was used (2.5%) (Table HR1).

The Registry has information on 2494 minor revisions (15%). The majority of these are an exchange of both the head and insert (70.5%) (Table HR2)

During the last five years there has been a decrease in the proportion of major total revision procedures from 38.2% of all revisions in 2001 to 31.6% in 2005. There has been a corresponding small increase in the proportion of both major partial and minor revisions during this period (Figure HR1).

Revisions of known Primary Hips

Analysis on revisions of known primary total hips is confined to the first revision of the known primary. There is a significant difference in the proportion of the different types of revision procedure. There is a higher proportion of minor revisions (33.4%) and of the major revisions, 77.8% are major partial revisions (femoral only 39.9%, acetabular only 37.8%) and 13.7% are major total revisions (Table HR3).

Diagnosis

A major factor contributing to the proportional differences in the type of revisions undertaken for the known primary group compared to the all revision group is that the know primary procedures are early revisions compared to the majority of revisions undertaken when the primary procedure is unknown. There are significant differences in the reasons for revision when the two groups are compared

The most common reason for revision in the all revision group is loosening (47.7%). Although this is also the case with the known primary group the proportion is much less (29.5%). Other diagnosis such as dislocation, fracture and infection are also more common in the known primary group (Table HR5).

Age and Gender

Just over half of all revisions are in women and this has slightly increased in recent years. In 2005 54.4% of revisions were female (Table HR6). There has been little change in the age of patients undergoing revision surgery with the major age group having revision procedures being between 75 and 84 years of age (34.7% in 2005) (Table HR7).

Outcomes

A variety of analysis has been done related to the outcomes of revision hip procedures. A meaningful interpretation is difficult without a full chronological history. The decision was therefore made to confine this Report to outcomes of revision procedures for known primary procedures. In addition we have limited the analysis to determining the outcomes of the first revision only.

Outcomes by Type of revision
There are differences in outcome dependant on the type of revision procedure that was undertaken. The outcomes for three types (major total, major partial and minor) initial revisions where determined.

Those procedures where infection was the diagnosis for the initial revision have been excluded from the analysis. Outcomes analysis of revisions for infected total hips is more complex than non infected revisions as there are many additional factors that need to be consider, including amongst others appropriate antibiotics, adequacy of debridement, infective organism etc. The Registry does not have information on all of these factors and a meaningful analysis is therefore difficult to undertake for this group of revisions.

Once infection is excluded and the analysis is limited to minor, major partial and major total revisions, the number of procedures available for analysis decreases from 1817 to 1529. Of theses, 144 (9.4%) have been subsequently revised (Table HR8).

A greater proportion of minor revisions undergo subsequent revision compared to major total and major partial revisions (12.1%, 8.5% and 7.9% respectively). This is also evident in the revisions per 100 observed component years (6.9, 5.2 and 4.7) (Table HR8).

Outcomes by age and gender
As the number of procedures is small the analysis by age has been limited to below 65 years and 65 years and above. The outcomes by age have been considered separately for the three types of initial revision. The smallest group is the major total revisions and little relevant comment can be made about this type of revision procedure at this stage (Table HR9).

The revision rate for major partial revisions appears to be unaffected by age and acetabular only revisions appear to have a slightly higher rate of re-revision compared to femoral component only (Table HR10).

There does not appear to be a clear difference in the subsequent revisions rate of minor revisions with respect to age. It does appear that the head only and cables and other minor component types of minor revision have higher rates of re-revision than head and insert and insert only revisions (Table HR11).

The only apparent gender difference is that males having femoral only partial revisions

have a higher rate of re-revision compared to females (Tables HR12-14)

Outcomes by Fixation
This is only relevant to major revisions. The numbers are too small to comment on for major total revisions (Table HR15). No difference is evident in the outcomes of major partial revisions by fixation (Table HR16)

Revision Hip Replacement - 1/9/1999 to 31/12/2005

Prosthesis Fixation and Usage

Table HR1: All Revisions - Major Revision Hip Replacement by fixation

Component Used	*Cementless*		*Cemented*		*Hybrid*		*Removal*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Femoral Component Only *	2114	14.9	898	6.3	.	.	.	.	3012	21.2
Acetabular Component Only*	3738	26.4	1543	10.9	.	.	.	.	5281	37.2
Femoral and Acetabular	2560	18.1	1040	7.3	1547	10.9	.	.	5147	36.3
Removal Prosthesis	.	.	.	.	.	.	192	1.4	192	1.4
Cement Spacer	.	.	.	.	.	.	351	2.5	351	2.5
Bipolar head and Femoral Comp	51	0.4	122	0.9	.	.	.	.	173	1.2
Reinsertion of Components	7	0.0	15	0.1	.	.	.	.	22	0.2
Total	**8470**	**59.7**	**3618**	**25.5**	**1547**	**10.9**	**543**	**3.8**	**14178**	**100.0**

Note: *Removal means that no hip component was exchanged*
* *Major partial revision*

Table HR2: All Revisions - Minor Revision Hip Replacement

Components Used	*N*	*%*
Head/Insert	1758	70.5
Insert only	228	9.1
Head Only	319	12.8
Cable/Other Minor Components	189	7.6
Total	**2494**	**100.0**

Figure HR1 Trends in Usage for Revision Hip Replacement by State and Territory

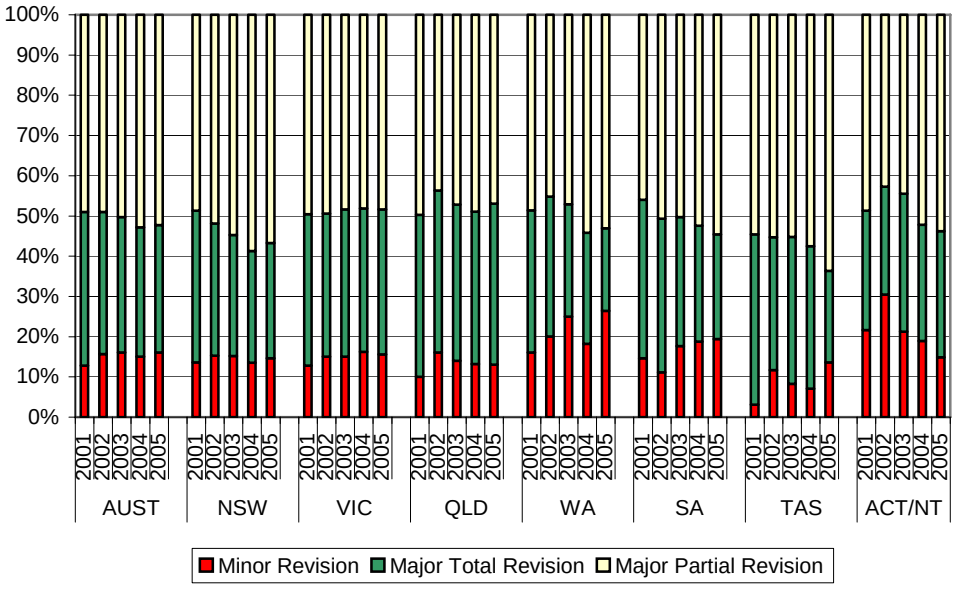


Table HR3: Revisions of Known Primary Procedures - Major Revision Hip Replacement by fixation

Component Used	*Cementless*		*Cemented*		*Hybrid*		*Removal*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Femoral Component Only *	334	27.6	148	12.3	.	.	.	.	482	39.9
Acetabular Component Only*	366	30.1	93	7.7	.	.	.	.	459	37.8
Femoral and Acetabular	87	7.2	37	3.1	42	3.5	.	.	166	13.7
Removal Prosthesis	.	.	.	.	.	.	23	1.9	23	1.9
Cement Spacer	.	.	.	.	.	.	74	6.1	74	6.1
Reinsertion of Components	4	0.3	3	0.2	.	.	.	.	7	0.5
Total	**791**	**65.3**	**281**	**23.2**	**42**	**3.5**	**97**	**8.0**	**1211**	**100.0**

Note: *Removal means that no hip component was exchanged*
. * *Major partial revision*

Table HR4: Revisions of Known Primary Procedures - Minor Revision Hip Replacement

Components Used	*N*	*%*
Head/Insert	390	64.4
Insert only	40	6.6
Head Only	135	22.3
Cable/Other Minor Components	41	6.8
Total	**606**	**100.0**

Table HR5: Diagnosis - Revision Hip Replacement

Diagnosis	*All Revisions*		*1st Revision with known primary*	
	Number	*%*	*Number*	*%*
Loosening	9194	47.7	833	29.5
Dislocation of Prosthesis	2925	15.2	807	28.6
Lysis	1919	10.0	42	1.5
Fracture	1659	8.6	481	17.1
Infection	1571	8.2	351	12.5
Wear Acetabulum	627	3.3	15	0.5
Pain	380	2.0	115	4.1
Implant Breakage Acetabular	369	1.9	22	0.8
Implant Breakage Stem	163	0.8	3	0.1
Implant Breakage Head	27	0.1	8	0.3
Other	423	2.2	143	5.1
Total	**19257**	**100.0**	**2820**	**100.0**

Note: *some patients had multiple diagnoses*

Sex and Age

Table HR6: Trends in Usage for Revision Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	1223	52.9	1091	47.1	2314	100.0
2002	1691	54.3	1425	45.7	3116	100.0
2003	1869	54.5	1563	45.5	3432	100.0
2004	1841	53.4	1608	46.6	3449	100.0
2005	1882	54.4	1579	45.6	3461	100.0

Table HR7: Trends in Usage for Revision Hip Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2001	258	11.1	346	15	717	31	761	32.9	232	10	2314	100.0
2002	364	11.7	491	15.8	940	30.2	1022	32.8	299	9.6	3116	100.0
2003	333	9.7	582	17	1063	31	1136	33.1	318	9.3	3432	100.0
2004	348	10.1	565	16.4	1034	30	1175	34.1	327	9.5	3449	100.0
2005	323	9.3	565	16.3	1013	29.3	1199	34.6	361	10.4	3461	100.0

Outcomes of Revision Hip Replacement

Table HR8: Subsequent revision rates for major partial, major total and minor first revisions of known primary total hips(excluding infection as a cause of revision)

Type of revision hip replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Major Total Revision	7	82	8.5	135	5.2	(2.09, 10.72)
Major Partial Revision	72	911	7.9	1546	4.7	(3.64, 5.87)
Minor Revision	65	536	12.1	936	6.9	(5.36, 8.85)
Total	**144**	**1529**	**9.4**	**2616**	**5.5**	**(4.64,6.48)**

Table HR9: Subsequent revision rate for major total revisions of known primary total hips by Age (excluding infection as a cause of revision)

Type of revision	*Age*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral & Acetabular	<65	2	33	6.1	59	3.4	(0.41, 12.30)
Femoral & Acetabular	>=65	5	49	10.2	76	6.6	(2.14, 15.40)
Total		**7**	**82**	**8.5**	**135**	**5.2**	**(2.09, 10.72)**

Table HR10: Subsequent revision rate for major partial revisions of known primary total hips by Age (excluding infection as a cause of revision)

Type of revision	*Age*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral Only	<65	8	153	5.2	247	3.2	(1.40, 6.37)
Femoral Only	>=65	24	318	7.5	495	4.8	(3.11, 7.21)
Acetabular Only	<65	16	176	9.1	316	5.1	(2.90, 8.23)
Acetabular Only	>=65	24	264	9.1	487	4.9	(3.15, 7.33)
Total		**72**	**911**	**7.9**	**1546**	**4.7**	**(3.64, 5.87)**

Table HR11: Subsequent revision rate for minor revisions of known primary total hips by Age (excluding infection as a cause of revision)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<65	25	185	13.5	349	7.2	(4.64, 10.58)
>=65	40	351	11.4	587	6.8	(4.87, 9.27)
Total	**65**	**536**	**12.1**	**936**	**6.9**	**(5.36, 8.85)**

Table HR12: Subsequent revision rate for major total revisions of known primary total hips by Sex (excluding infection as a cause of revision)

Type of revision	*Sex*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral & Acetabular	Male	4	42	9.5	69	5.8	(1.58, 14.82)
Femoral & Acetabular	Female	3	40	7.5	65	4.6	(0.95, 13.41)
Total		**7**	**82**	**8.5**	**135**	**5.2**	**(2.09, 10.72)**

Table HR13: Subsequent revision rate for major partial revisions of known primary total hips by Sex (excluding infection as a cause of revision)

Type of revision	*Sex*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral Only	Male	22	247	8.9	382	5.8	(3.61, 8.73)
Femoral Only	Female	10	224	4.5	361	2.8	(1.33, 5.09)
Acetabular Only	Male	16	166	9.6	292	5.5	(3.13, 8.90)
Acetabular Only	Female	24	274	8.8	511	4.7	(3.01, 6.99)
Total		**72**	**911**	**7.9**	**1546**	**4.7**	**(3.64, 5.87)**

Table HR14: Subsequent revision rate for minor revisions of known primary total hips by Sex (excluding infection as a cause of revision)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Male	27	228	11.8	403	6.7	(4.41, 9.74)
Female	38	308	12.3	533	7.1	(5.05, 9.79)
Total	**65**	**536**	**12.1**	**936**	**6.9**	**(5.36, 8.85)**

Table HR15: Subsequent revision rates for major total revisions of known primary total hips by cement fixation (excluding infection as a cause of revision)

Type of revision	*Cement fixation*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral & Acetabular	Cementless	3	54	5.6	80	3.8	(0.78, 11.01)
Femoral & Acetabular	Cemented	1	10	10.0	21	4.8	(0.12, 26.54)
Femoral & Acetabular	Acetabular Cement Only	1	5	20.0	13	7.5	(0.19, 42.04)
Femoral & Acetabular	Femoral Cement Only	2	13	15.4	21	9.7	(1.17, 35.01)
Total		**7**	**82**	**8.5**	**135**	**5.2**	**(2.09, 10.72)**

Table HR16: Outcomes of revisions of major partial hip of known primary total hips by cement fixation (excluding infection as a cause of revision)

Type of revision	*Cement fixation*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral Only	Cementless	21	329	6.4	518	4.1	(2.51, 6.20)
Femoral Only	Cemented	11	142	7.7	225	4.9	(2.44, 8.76)
Acetabular Only	Cementless	33	359	9.2	655	5.0	(3.47, 7.07)
Acetabular Only	Cemented	7	81	8.6	148	4.7	(1.91, 9.78)
Total		**72**	**911**	**7.9**	**1546**	**4.7**	**(3.64, 5.87)**

AOA National Joint Replacement Registry
Knee Replacement Data

General Introduction

The analysis of knee procedures for this report is based on data received by the Registry with a procedure date prior to the end of 2005. There were 138,803 primary and revision knee procedures. This is an additional 33,080 knee procedures compared to the 2005 Report.

Categories of Knee Replacement

There are a number of different ways knee replacement procedures can be categorised. The Registry considers knee procedures to be either primary or revision procedures. Primary procedures are categorised according to the class of prostheses used. These include the unispacer, patella/trochlear and unicompartmental knees as well as total knee replacement procedures. Revision procedures are categorised as major or minor. A major revision involves the removal and/or replacement of a major component. This is defined (with the exception of the patella) as a component that interfaces with bone i.e. either the femoral and/or tibial component. A minor revision is a revision where a major component has not been removed or replaced. Examples of this include patella replacement, tibial insert exchange, or both.

Gender

In general knee replacement is more common in women (55.9%). There are however gender variations depending on the type of procedure. Primary total knee replacements are most frequently undertaken in women (57.4%). This is also the case with patella/trochlear replacements although female dominance is more evident (76.7%). There is an increase in the frequency of use of the other types of primary procedures in males with almost equal proportions of males and females receiving unispacer and unicompartmental replacements. Revision procedures are done slightly more commonly in females (Table KG1).
During the last five years Registry data indicate that there has been a slight increase in the proportion of females having both primary unicompartmental and total knee replacement (Figure KG1). Conversely the proportion of men undergoing these procedures has decreased. The gender trend in revision surgery is the reverse with a small decrease in the proportion of women having revision procedures.

Age

The mean age for all knee replacement procedures is 68.9 years (females: 69.2 yrs, males: 68.5yrs). Primary unispacer, patella/trochlear and unicompartmental knees are generally used in younger individuals compared to primary total knees (unispacer 54.6 yrs; patella/trochlear 59.2 yrs; unicompartmental 65.7 yrs; and total 69.4 yrs) (See Supplementary report on web site).

Although unispacer, patella/trochlear and unicompartmental knee replacements are performed more commonly in younger individuals there is a significant number of older people undergoing these procedures. The number that are 65 years or older varies depending on the type of procedure, (unispacer 10.3%, patella/trochlear 33.2% and unicompartmental 54.4%). This compares to 70.9% for primary total knee replacement (Table KG2). The mean age for revision procedures is 69.8 yrs (See Supplementary report on web site).

Over the last five years there has been an increase in the proportion of primary knee replacements undertaken in the younger age groups. This is true for both primary unicompartmental and total knee replacement in individuals less than 65yrs at the time of surgery (Figure KG2). The

proportion of individuals having total knee replacement between the ages of 65 and 84 has declined. The proportion of individuals 85yrs or older has remained relatively constant during this period (data not shown).

Diagnosis

The indication for almost all primary knee replacement procedures is osteoarthritis (unispacer (100%), patella/trochlear (98.8%), unicompartmental (98.6%) and primary total knee replacement (96.6%)). The principal cause for revision knee surgery is aseptic loosening (37.8%) (See Supplementary report on web site).

Use of different Categories of Knee Replacement

The most common knee procedure is a primary total knee (77.7% of all knee procedures). The proportion of primary unicompartmental and primary patella/trochlear procedures are 13.3% and 0.5% respectively. There have only been 39 unispacer procedures recorded by the Registry. Revisions account for the remaining 8.6% of all knee procedures (Table KG1).

The proportion of all knee replacement procedures that are primary total knee replacements has increased from 76.8% (2001) to 80.1% (2005). The proportion of unicompartmental knees has decreased from a high of 15.1% in 2002 to 11.8% in 2005. Revision procedures have decreased from 9.3% (2001) to 8.2% (2005). It is important to appreciate that this is not indicative of a reduction in the rate of revision. It is a simple measure of the proportion of revision procedures as a percentage of all knee procedures. This proportion is affected by the rate of change of the other types of procedure (Figure KG3).

State and Territory Variation in Use

There is some variation by state in the proportional use of the major knee procedures (primary unicompartmental and total knee replacement as well as revision procedures). All states have shown a decrease in the use of unicompartmental knees with the exception of Tasmania where there has been a slight increase. The use however varies significantly between the states. In South Australia 18% of knees are unicompartmental procedures and 5.8% in Queensland.

There is also variation in the proportion of procedures that are revision procedures. In 2005 revision procedures account for 10.6% of all knee procedures in South Australia; this is 5.4% in Tasmania. The remaining states and territories have a similar proportion of revision procedures (Figure KG3).

Bilateral Knee procedures

Bilateral procedures are when both knees have undergone primary knee replacement no matter the type of primary procedure or the timing of the second knee operation. The Registry has recorded 18,996 individuals with bilateral knee procedures, 28.4% of those were performed on the same day. The most common same day bilateral knee replacement is bilateral primary total knee replacement. This combination of knee replacement accounts for 75.9% of all same day bilateral procedures. Of the remaining same day bilateral procedures 20.2% are bilateral unicompartmental knee replacements (Table KG3).

General Comparison of Outcomes

Total knee replacement is the least revised of all primary knee procedures (total 2.1% unicompartmental 4.9%, patella/trochlear 5.6%). Almost two thirds of the small number of unispacer procedures recorded by the Registry, have been revised (61.5%) (Table KG4).

This difference is also evident when comparing revisions per 100 component years (0.9 total, 2.1 unicompartmental, 2.8 patella/trochlear and 50.8 unispacer procedures).

Comparison of the cumulative revision rates further highlights the difference in the risk of revision for each of these procedures. This is the proportion of procedures revised at a defined time since the original procedure. At 4 years the

cumulative revision rate of primary total knee procedures is 3.36%, unicompartmental 7.74% and patella/trochlear 10.7%. The Registry only has a cumulative revision rate for unispacer procedures until two years and at two years this is 62.0% (Table KG5).

Knee Replacement - 1/9/1999 to 31/12/2005

Definitions

Unispacer	*medial or lateral unicompartmental articular spacer*
Patella/trochlear:	*patella/trochlear replacement*
Unicompartmental:	*either medial or lateral unicompartmental knee replacement*
Primary total:	*primary total knee replacement*
Revision:	*re-operation for exchange or removal of one or more components*

Demographics of patients undergoing Knee Replacement

Table KG1: Number of Knee Replacements by Sex

Type of knee replacement	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
UniSpacer	19	48.7	20	51.3	39	0.0
Patella/trochlear	518	76.7	157	23.3	675	0.5
Unicompartmental Knee	8962	48.7	9436	51.3	18398	13.3
Primary Total Knee	61878	57.4	45923	42.6	107801	77.7
Revision Knee	6166	51.9	5724	48.1	11890	8.6
Total	**77543**	**55.9**	**61260**	**44.1**	**138803**	**100.0**

Note: *In some tables entries may not sum to totals due to rounding*

Figure KG1: Usage of Unicompartmental and Primary Total by Sex (female) and Year

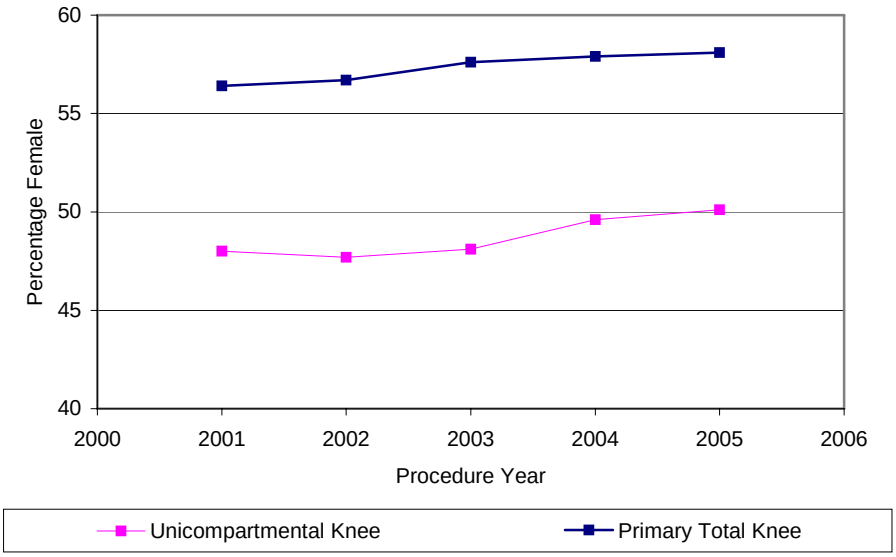


Table KG2: Summary statistics of age for All Knee Replacements

Type of knee replacement	*<=54*		*55-64*		*65-74*		*75-84*		*>=85*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
UniSpacer	18	46.2	17	43.6	3	7.7	1	2.6	.	.	39	0.0
Patella/trochlear	259	38.4	192	28.4	126	18.7	86	12.7	12	1.8	675	0.5
Unicompartmental	2506	13.6	5889	32.0	5982	32.5	3691	20.1	330	1.8	18398	13.3
Primary Total Knee	7230	6.7	24145	22.4	40916	38.0	32117	29.8	3393	3.1	107801	77.7
Revision Knee	1036	8.7	2416	20.3	3978	33.5	3920	33.0	540	4.5	11890	8.6
Total	**11049**	**8.0**	**32659**	**23.5**	**51005**	**36.7**	**39815**	**28.7**	**4275**	**3.1**	**138803**	**100.0**

Figure KG2: Usage of Unicompartmental and Primary Total Knee Replacement by Age (percentage < 65) and Year

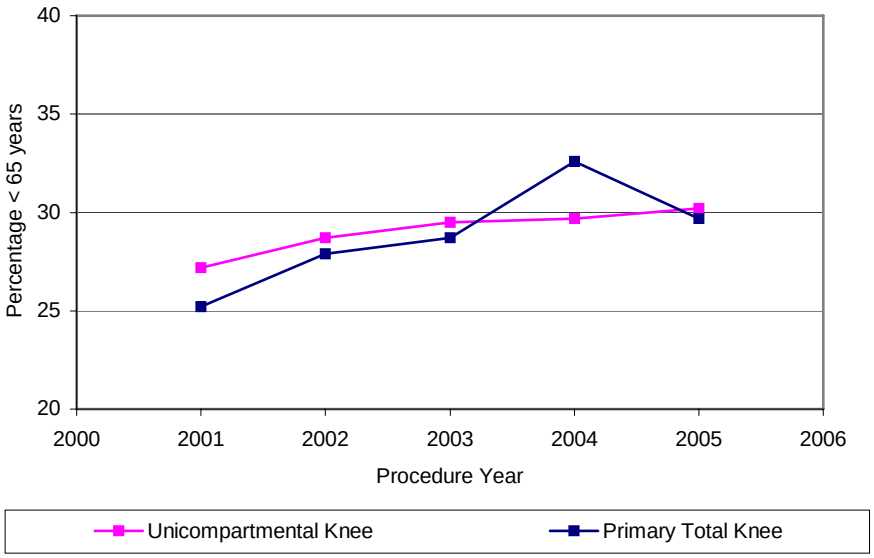


Figure KG3: Trends in Usage of Unicompartmental, Primary Total and Revision Knee Replacement by State and Territory

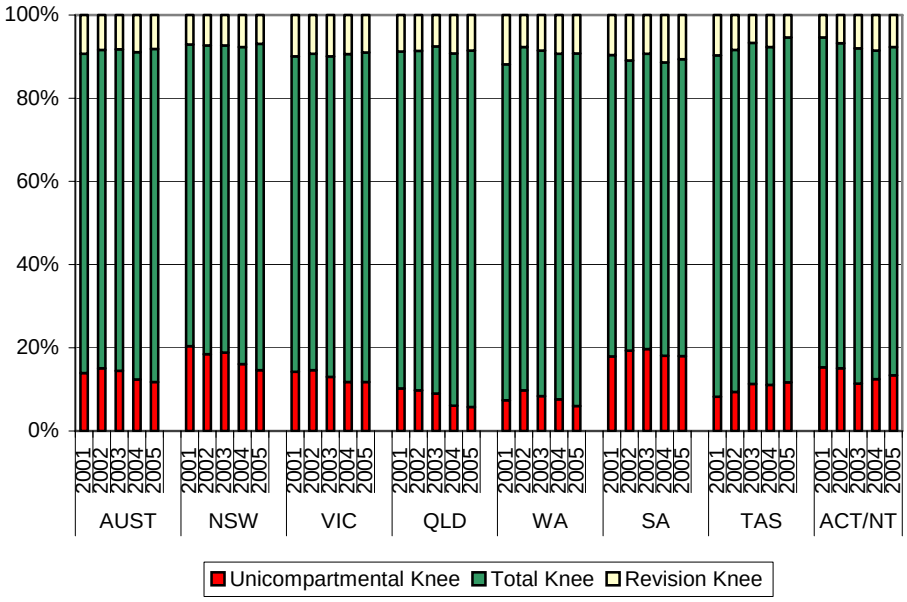


Table KG3: Days Between Procedures for Bilateral Primary Knees

Bilateral Procedures	***Days between Bilateral Procedures***										***Total***	
	Same Day		*<6 weeks*		*6 weeks - 6 months*		*6 months - 3 years*		*>=3 years*			
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Both Patella/trochlear	70	0.4	4	0.0	11	0.1	17	0.1	.	.	102	0.5
Both Primary Total	4097	21.6	304	1.6	2563	13.5	7806	41.1	889	4.7	15659	82.4
Both Unicompartmental	1092	5.7	53	0.3	368	1.9	743	3.9	74	0.4	2330	12.3
Patella/trochlear & Primary Total Knee	2	0.0	1	0.0	.	.	8	0.0	5	0.0	16	0.1
Patella/trochlear & Unicompartmental	.	.	.	.	.	.	4	0.0	1	0.0	5	0.0
Primary Total Knee & Primary Unispacer	.	.	.	.	1	0.0	.	.	.	.	1	0.0
Unicompartmental & Primary Total	137	0.7	11	0.1	81	0.4	544	2.9	107	0.6	880	4.6
Unicompartmental & Primary Unispacer	.	.	.	.	1	0.0	2	0.0	.	.	3	0.0
Total	**5398**	**28.4**	**373**	**2.0**	**3025**	**15.9**	**9124**	**48.0**	**1076**	**5.7**	**18996**	**100.0**

Table KG4: Revision by Type of Primary Knee Replacement

Type of knee replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
UniSpacer	24	39	61.5	47	50.8	(32.57, 75.64)
Patella/Trochlear	38	675	5.6	1375	2.8	(1.96, 3.79)
Unicompartmental	904	18398	4.9	42605	2.1	(1.99, 2.26)
Primary Total	2253	107802	2.1	241145	0.9	(0.90, 0.97)
Total	**3219**	**126914**	**2.5**	**285173**	**1.1**	**(1.09, 1.17)**

Table KG5: Cumulative percentage revision by Type of Primary Knee Replacement

Type of knee replacement	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Unispacer	41.6 (27.88, 58.67)	62.0 (46.44, 77.71)		
Patella/Trochlear	3.06 (1.91, 4.88)	5.73 (3.97, 8.25)	9.20 (6.54, 12.88)	10.7 (7.55, 15.10)
Unicompartmental	2.37 (2.15, 2.62)	4.57 (4.24, 4.93)	6.24 (5.83, 6.69)	7.74 (7.20, 8.33)
Total Knee	1.05 (0.99, 1.12)	2.17 (2.07, 2.28)	2.84 (2.71, 2.96)	3.36 (3.21, 3.52)

Unispacer and Patella/Trochlear Prostheses

These procedures along with unicompartmental knee replacements are partial knee replacement procedures that involve surgery to a single knee compartment. Compared to other types of knee replacement only a small number of these procedures have been undertaken. The Registry has information on 39 unispacer procedures and 675 patella/trochlear replacement procedures.

Unispacer

The Registry first reported the use of this category of knee replacement in 2004. Only two different types of prostheses have been used in Australia. They are the Zimmer Unispacer and Intercushion (Advanced Biosurfaces Inc.) (Table KUP1). Neither of the prostheses are currently listed on the Australian Prostheses schedule. The last unispacer prosthesis was used in this country in April 2005. The Registry has recorded only three additional primary procedures during the last 12 months. Unispacer prostheses have been used in 39 individuals almost half of whom were under the age of 54 (46.2%) and of the remainder nearly all were between 55-64 years (43.6%). A majority of these prostheses have been revised (61.5%) (7/9 Intercushion and 17/30 Zimmer unispacer) (data not shown). The number revised per 100 component years is 50.8 (Table KUP2). The cumulative revision rates for all unispacers at one and two years are 41.6% and 62.0% respectively (Table KUP3 Figure KUP1). The major reasons for revision were pain 28.6%, synovitis 17.9% and loosening 14.3% (data not shown).

Patella/trochlear

Currently the Registry has information on 675 patella/trochlear procedures (Table KUP4). The number of procedures has increased by 36.6% in the last 12 months.

Patella/trochlear replacement is more common in females (76.7%) (Table KG1). It is used most frequently in younger individuals (38.4%) below 55 yrs, falling to 14.5% over the age of 75 yrs (Table KG2). Seven different trochlear components have been combined with 14 different patella prostheses. On occasions no patella component has been used (Table KUP4).

Almost 6% of all patella/trochlear procedures have been revised. Apart from unispacers, these prostheses have the highest rate of revisions per 100 observed component years (2.8) compared to other categories of knee replacement procedures (Table KG4). The cumulative revision rate at 4 years for these prostheses is 10.7% (Table KUP6). The major reasons for revisions were loosening 20.9%, pain 16.3% and progression of disease 11.6% (data not shown).

When comparing the different types of prostheses, the Avon trochlear prosthesis has the lowest revision rate per 100 component years (1.5). Other prostheses have greater than twice the revision rate per 100 component years (Table KUP5). The cumulative revision rate of the Avon at 3 years is 3.74%. The LCS and Lubinus patella glide have cumulative revision rates of 12.3% and 11.4% respectively at the same point in time (Table KUP7) (hazard ratio (adjusted for age and sex); LCS v. Avon = 2.658; 95% CI (1.063,6.645) p=0.0365 and (hazard ratio (adjusted for age and sex); Lubinus v. Avon = 3.558; 95% CI (1.240,10.208) p=0.0182) (data not shown). Individual cumulative percentage revision curves for the three most frequently used prostheses have been presented (Figures KUP3, KUP4 and KUP5). There is some variation in outcome depending on the type of patella used in combination with the different trochlear components. For many of these combinations only a small number of procedures have been performed and this precludes any relevant statistical analysis of outcome based on the type of patella prostheses used.

Unispacer Prostheses and Patella/trochlear Replacement – 1/9/1999 to 31/12/2005

Unispacer Prosthesis Usage

Table KUP1: Prosthesis Usage - Unispacer

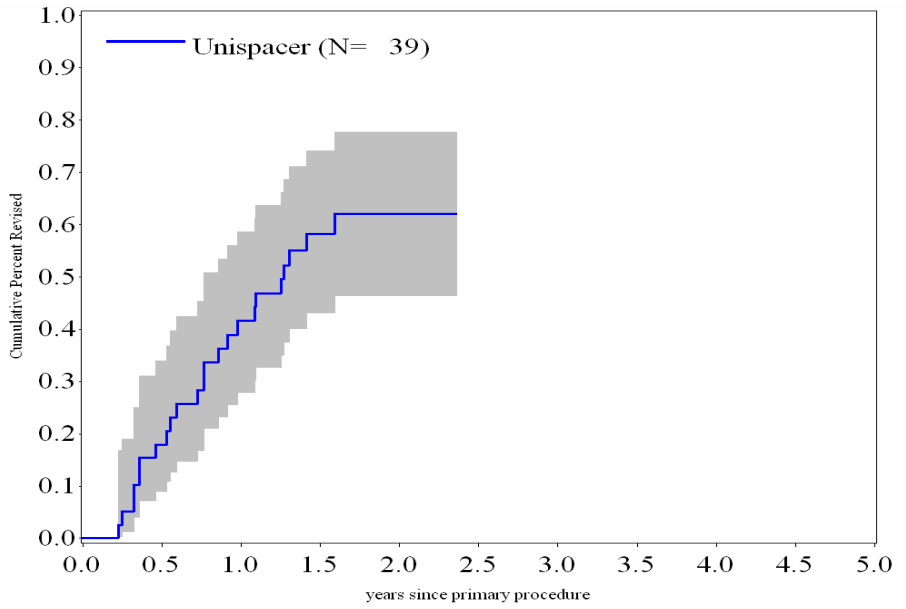
Unispacer	*Number*	*%*
InterCushion	9	23.1
Unispacer	30	76.9
Total	**39**	**100.0**

Outcomes of Unispacer Prostheses

Table KUP2: Unispacer Procedures requiring Revision

Unispacer	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
InterCushion	7	9	77.8	9	77.7	(31.24, 160.1)
Unispacer	17	30	56.7	38	44.5	(25.93, 71.26)
Total	**24**	**39**	**61.5**	**47**	**50.8**	**(32.57, 75.64)**

Figure KUP1: Cumulative percentage revision of Revision of Unispacer



Unispacer	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Unispacer	39	32	22	12	6	1	0	0	0	0	0

Table KUP3: Yearly cumulative percentage revision of Unispacer

Unispacer	*Cumulative Percent Revised (95% CI)*	
	1 year	*2 years*
Unispacer	41.6 (27.88, 58.67)	62.0 (46.44, 77.71)

Table KUP4:Prosthesis Usage - Patella/trochlear Replacement

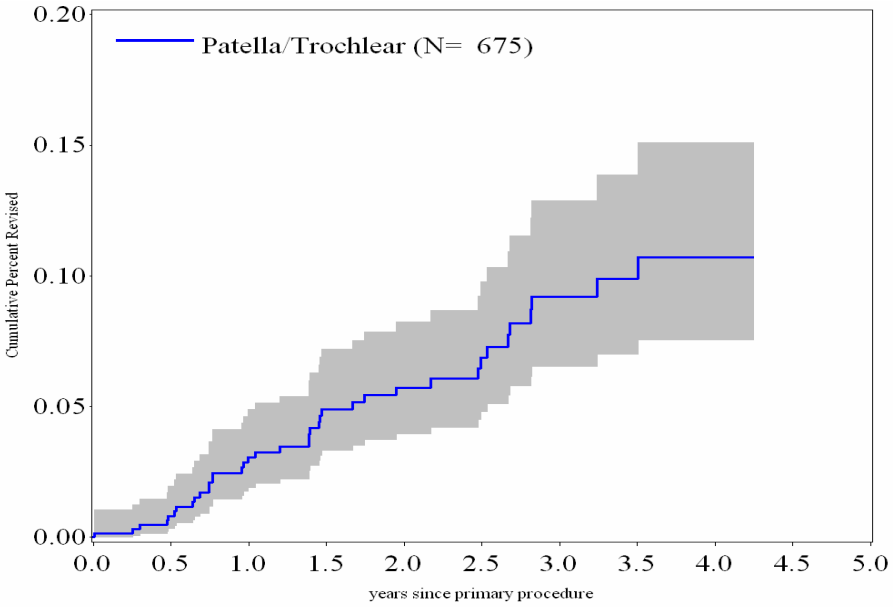
Patella/trochlear replacement	*Patella*	*Number*	*%*
Avon	Kinemax Plus	188	27.9
	Avon	39	5.8
	-	3	0.4
	Nexgen	2	0.3
	Duracon	1	0.1
LCS	LCS	186	27.6
	-	5	0.7
	Nexgen	1	0.1
	Nexgen MBK	1	0.1
	PFC Sigma	1	0.1
	Scorpio	1	0.1
Lubinus Patella Glide	Duracon	73	10.8
	Lubinus Patella Glide	36	5.3
MOD III	MOD III	59	8.7
	LCS	4	0.6
	-	1	0.1
	Genesis II	1	0.1
RBK	RBK	36	5.3
	Natural Knee II	1	0.1
	Nexgen	1	0.1
Themis	Themis	32	4.7
	-	1	0.1
	Nexgen	1	0.1
Global Custom Made	-	1	0.1
Total		**675**	**100.0**

Note: *- some of these patients have had a previous patellectomy*
model name not repeated but continues down the column until change of model name

Table KUP5: Patella/Trochlear Procedures requiring Revision

Patella/trochlear	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Avon	8	233	3.4	538	1.5	(0.64, 2.93)
Global Custom Made	0	1	0.0	3	0.0	(0.00, 121.5)
LCS	11	195	5.6	327	3.4	(1.68, 6.02)
Lubinus Pat Glide	8	109	7.3	215	3.7	(1.61, 7.33)
MOD III	8	65	12.3	211	3.8	(1.63, 7.46)
RBK	1	38	2.6	26	3.9	(0.10, 21.47)
Themis	2	34	5.9	55	3.6	(0.44, 13.16)
Total	**38**	**675**	**5.6**	**1375**	**2.8**	**(1.96, 3.79)**

Figure KUP2: Cumulative percentage revision of Patella/Trochlear

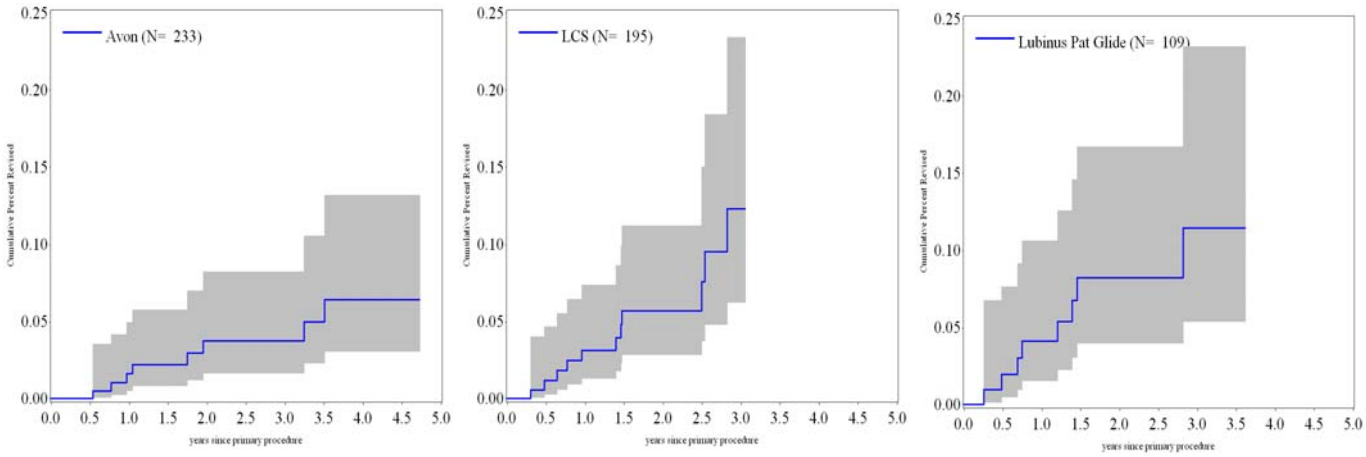


Patella/trochlear	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Patella/Trochlear	675	573	490	388	312	232	163	108	76	47	24

Table KUP6: Yearly cumulative percentage revision of Patella/Trochlear

Patella/trochlear	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Patella/Trochlear	3.06 (1.91, 4.88)	5.73 (3.97, 8.25)	9.20 (6.54, 12.88)	10.7 (7.55, 15.10)

Figures KUP3 - 5: Cumulative percentage revision of Revision of Patella/Trochlear



Patella/trochlear	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Avon	233	200	171	145	122	98	81	65	46	28	11
LCS	195	161	144	106	77	49	23				
Lubinus Pat Glide	109	99	80	62	52	39	24	11	6		

Table KUP7 Yearly cumulative percentage revision of Patella/Trochlear

Patella/trochlear	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Avon	1.63 (0.53, 4.96)	3.74 (1.68, 8.23)	3.74 (1.68, 8.23)	6.43 (3.08, 13.20)
LCS	3.14 (1.32, 7.39)	5.70 (2.86, 11.18)	12.3 (6.24, 23.43)	
Lubinus Pat Glide	4.13 (1.57, 10.63)	8.25 (3.98, 16.71)	11.4 (5.41, 23.23)	

Unicompartmental Knee Replacement

This report is based on the analysis of 18,398 unicompartmental knee procedures recorded by the Registry with a procedure date prior to the end of December 2005.

Usage

The proportion of all knee procedures that are unicompartmental knee replacements declined from 15.1% in 2002 to 11.8% in 2005 (Figure KG3). There has also been a decrease in the absolute number of unicompartmental knee replacements. During 2003, the first year the Registry had full national data, 4,076 unicompartmental procedures where undertaken. This decreased by almost 10% in 2004 to 3,670 procedures. In 2005 there was a small increase compared to 2004 but still less than the number undertaken in 2003 (Table KU1)

Changes in use with Gender and Age

As mentioned in the general introduction on knee replacement there has been a small increase in females and younger patients receiving unicompartmental knee replacement over the last five years (Table KU2 and KU3).

Although unicompartmental knee replacement is often considered a prosthesis that should preferentially be used in younger individuals, in 2005 just over 1 in 5 of all procedures were performed on individuals older than 75 years (20.5%). Just over 65% of patients are between the ages of 55 and 74 years (65-74 (30.8%) and 55-64 (34.4%)). The percentage of individuals undergoing unicompartmental knee replacement that were under the age of 55 years was 14.4% (Table KU3).

Fixation

Cementing both the femoral and tibial components is the most common method of fixation for unicompartmental knees (90.9% Table KU4). There is some state and territory variation in the type of fixation. In Queensland and Western Australia 100% of unicompartmental knees have both components cemented. This figure is greater than 95% in the remaining states with the exception of Victoria, where cement fixation is used in 66% of all unicompartmental knees. (Figure KU2). Hybrid fixation is used in less than 1% of all procedures (Table KU4).

Types of Prostheses Used

There has been an increase in the number of different types of unicompartmental prostheses recorded by the Registry. Two additional prostheses were used in 2005. The Registry now has information on 21 different types of unicompartmental prostheses, 18 of which were used in the last 12 months. (Table KU1). There continues to be an increase in the number of different types of prostheses available on the Australian market.

The ten most frequently used prostheses account for 90% of all unicompartmental procedures in 2005 and are listed in Table KU1. This has declined from 95.1% in the previous year and indicates that the proportional use of less common prostheses has increased.

Since the Registry commenced data collection the Oxford 3 has been the most used unicompartmental prosthesis. There has been a continual decline in its proportional use since 2001 (41.3% 2002 to 28.7% in 2005) (Figure KU1). The frequency of other commonly used prostheses has also declined. The Endo-Model Sled, AMC and the Active Knee have shown an increase in use during the last 12 months. The ZUK uni, a new prosthesis was used for the first time in 2005. The PFC Sigma and LCS were not used in 2005 and the use of the Natural Unicompartmental Knee and Preservation sliding was minimal (data not shown).

Outcomes of Unicompartmental Knee Replacement

Of the 18,398 unicompartmental knee replacements recorded by the Registry 904 (4.9%) have been revised. There have been 2.1 revisions per 100 observed

component years. At one year the cumulative revision rate is 2.37% and at 4 years it is 7.74% (Table KG5). There are significant differences in the rate of revision depending on age, gender and the type of unicompartmental prosthesis used.

Outcomes related to Age and Gender variation

Gender and age has a significant impact on the risk of revision surgery for unicompartmental knee replacement. In the under 55 age group 3.9% are revised within 12 months and 12.8% are revised by 4 years. The revision rates decrease with increasing age (Table KU5, KU6 and Figure KU3).

There is no significant difference in outcomes related to gender Table KU7, KU8 and Figure KU4). Both are revised frequently in the under 55 age group (12.9% at 4 years for males and 12.7% for females). Unicompartmental knee replacement in older males is associated with a reduction in revision but this reduction occurs between 55 and 65 years of age and then remains similar after 65 years. Females also show a reduction in revision rates but unlike males the reduction occurs more slowly and is most evident after 75 years. (Table KU9 and Table KU10, Figure KU5 and Figure KU6).

Variation with Fixation

There is no difference in the revision rate depending on the method of fixation. The data however have not been presented as part of this report. Caution should be used in the interpretation of this result. Almost all unicompartmental prostheses are inserted with cement fixation. Cementless fixation is largely confined to a small number of prostheses only one of which has been used in significant numbers. This is the HA coated Unix.

A comparison of cementless and cemented fixation for unicompartmental knees is therefore largely a comparison of the Unix with other unicompartmental knee prostheses and as such is not a valid comparison of cementless and cemented prostheses.

Comparison to Total Knee Replacement

Primary unicompartmental knee replacement has a considerably higher revision rate than primary total knee replacement. When comparing outcomes for the diagnosis of osteoarthritis, unicompartmental knees have a four year revision rate of 7.71% compared to 3.36% for primary total knees (hazard ratio = 1.92, 95%CI (1.78, 2.08) $p<0.0001$). (Table KU11 and Table KU12 and Figure KU7).

The difference in outcome of primary unicompartmental and primary total knees varies with age and gender. Primary total knee replacement is much less likely to require revision than unicompartmental knees at any age for either gender (Table KU13 and Table KU14 and Figures KU8 – KU15).

Outcome of Specific Types of Prostheses

When the Registry analyses outcomes for specific prostheses it usually compares revision rates against the overall rate for all prostheses within the relevant category. There is usually a large number of different prostheses within each of the categories most having similar rates of revision. When a prostheses differs from the group as a whole it is identified as a prosthesis that has a higher than anticipated revision rate.

This situation does not occur with unicompartmental knee replacement. The number of different prostheses types within this category is relatively small compared to most other categories. There is also considerable variation in the revision rates for individual prostheses, with over a 10% difference in the revision rates at 4 years. Some of the prostheses that have been revised more often have been used in large numbers. The effect of pooling these prostheses is that combined revision rate is significantly higher than for some prostheses used. This makes it difficult to distinguish the revision rates of many of the prostheses used. This issue was first discussed in the 2004 report and at that time the Registry decided to combine three commonly used prostheses

with the lowest revision rates each having over a 1000 observed component years at that time.

Using this approach in 2004 the Registry identified 2 prostheses that had a higher than anticipated revision rate compared to the comparator. They were the Allegretto and Preservation unicompartmental prostheses. At that time the Preservation-Mobile and Preservation-Fixed were not separated in the analysis of the Preservation. This was however done in the 2005 Report. In that report five prostheses where identified as having a higher than anticipated rate of revision. They were the Allegretto, Natural unicompartmental knee, Oxford 3, Preservation-Fixed and Preservation-Mobile.

This year we have analysed the prosthesis specific revision rates in a number of ways. The first was to compare the rates for all prostheses to the Oxford 3, which is the most used prosthesis within Australia. Using this approach the prostheses fall into three different categories: those that have a significantly higher rate of revision compared to the Oxford 3, those that have significantly lower rate and those that do not have a significantly different rate of revision.

There were three prostheses that had a significantly higher rate of revision compared to the Oxford 3. They were the Preservation Mobile (hazard ratio 2.17; CI (1.60,2.94) P= < 0.0001), the AMC (hazard ratio 2.36;CI(1.48,3.75) P= 0.0003) and the Natural unicompartmental hazard ratio 1.77;CI(1.07,2.92) P= 0.026 The AMC has been identified for the first time (Table KU16).

There were three prostheses that performed significantly better than the Oxford 3. They were the Repicci, (hazard ratio 0.64;CI(0.49,0.83) P=0.0006), M/G (hazard ratio 0.72;CI(0.55,0.94) P= 0.0174) the Unix (hazard ratio 0.66;CI(0.49, 0.91) P= 0.0096). These prostheses had significant use with over 1,000 procedures recorded for each. The revision rates for the remaining unicompartmental prostheses were not significantly different from the Oxford 3 (Table KU17).

The second analysis that was undertaken compared all prostheses to the combined rate of the three prostheses that were identified as having a significantly lower revision rate than the Oxford 3 (Repicci, M/G and Unix). This is the same analysis as was undertaken in the last two reports. The reason for this analysis was to determine if prostheses identified as not being significantly different from the Oxford 3 were different from the combined rate of the three prostheses identified as having significantly fewer revisions.

In addition to the three previously identified unicompartmental knee replacements with higher than anticipated revision rates the following unicompartmental knees were identified as having a significantly higher rate of revision compared to the three comparators. They are the Oxford 3 (hazard ratio 1.49;CI(1.24,1.79) P= < 0.0001), Preservation-Fixed (hazard ratio 1.8 CI(1.37,2.35) P= < 0.0001, Allegretto (hazard ratio 1.51;CI(1.17,1.96) P=0.0017), Advance (hazard ratio 7.91;CI(3.23,19.39) P= < 0.0001, balanSys (hazard ratio 2.91;CI(1.18,7.12) p= 0.0202), and Genesis (hazard ratio 1.75;CI(1.27,2.4) P=0.0005), were identified as having a higher than anticipated revision rate than the comparator group. (Table KU18).

Cumulative percentage revision curves for many of the individual unicompartmental prostheses have been provided for comparison (Figures KU16-28). Results of analysis to determine the yearly cumulative percent revised for most prostheses are provided in Table KU19.

Unicompartmental Knee Replacement - 1/9/1999 to 31/12/2005

Prosthesis Usage

Table KU1: 10 Most common Unicompartmental Knee Prostheses used in Primary Knee

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Oxford 3 (1057)	Oxford 3 (1578)	Oxford 3 (1365)	Oxford 3 (1137)	Oxford 3 (1097)
2	Repicci (337)	Repicci (579)	Repicci (424)	Repicci (374)	Preserv-Fixed (333)
3	Allegretto (234)	Allegretto (374)	Preserv-Fixed (371)	Preserv-Fixed (363)	Genesis (297)
4	M/G (209)	M/G (334)	M/G (349)	M/G (362)	M/G (297)
5	Unix (182)	Preserv-Fixed (294)	Allegretto (336)	Genesis (295)	GRU (291)
6	PFC Sigma (90)	Unix (236)	GRU (318)	GRU (289)	Unix (267)
7	Preserv-Fixed (79)	Preserv-Mobile (149)	Genesis (276)	Unix (238)	Repicci (258)
8	Genesis (51)	Genesis (129)	Unix (260)	Allegretto (190)	Active Knee (222)
9	Natural Knee (37)	GRU (46)	Preserv-Mobile (121)	Endo-Mod Sled (177)	Endo-Mod Sled (208)
10	Preserv-Mobile (15)	Natural Knee (42)	Endo-Mod Sled (101)	AMC (65)	Allegretto (167)
% using 10 most common	99.1%	97.5%	96.2%	95.1%	90%
Total N Procedures	2312	3858	4076	3670	3821
Total N Prosthesis Types	14	16	16	16	18

Figure KU1: 5 Most common Unicompartmental Knee Prostheses used in Primary Knee

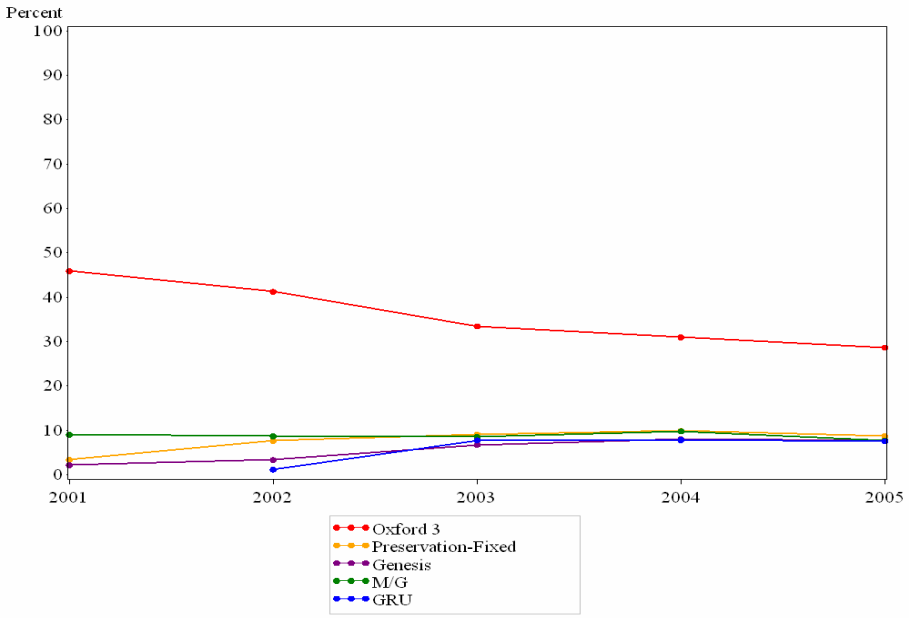


Table KU2: Usage of Unicompartmental Knee Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	1110	48.0	1202	52.0	2312	100.0
2002	1842	47.7	2016	52.3	3858	100.0
2003	1963	48.2	2113	51.8	4076	100.0
2004	1821	49.6	1849	50.4	3670	100.0
2005	1913	50.1	1908	49.9	3821	100.0

Table KU3: Usage of Unicompartmental Knee Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2001	316	13.7	698	30.2	810	35.0	459	19.9	29	1.3	2312	100.0
2002	515	13.3	1160	30.1	1308	33.9	806	20.9	69	1.8	3858	100.0
2003	518	12.7	1316	32.3	1351	33.1	814	20.0	77	1.9	4076	100.0
2004	505	13.8	1217	33.2	1117	30.4	761	20.7	70	1.9	3670	100.0
2005	550	14.4	1313	34.4	1177	30.8	706	18.5	75	2.0	3821	100.0

Table KU4: Prosthesis Fixation - Unicompartmental Knee Replacement

Fixation	*Number*	*%*
Tibial and femoral cementless	1531	8.3
Tibial and femoral cemented	16732	90.9
Tibial only cemented	71	0.4
Femoral only cemented	64	0.3
Total	**18398**	**100.0**

Figure KU2: Trends in Prosthesis Fixation – Unicompartmental Knee Replacement by State and Territory

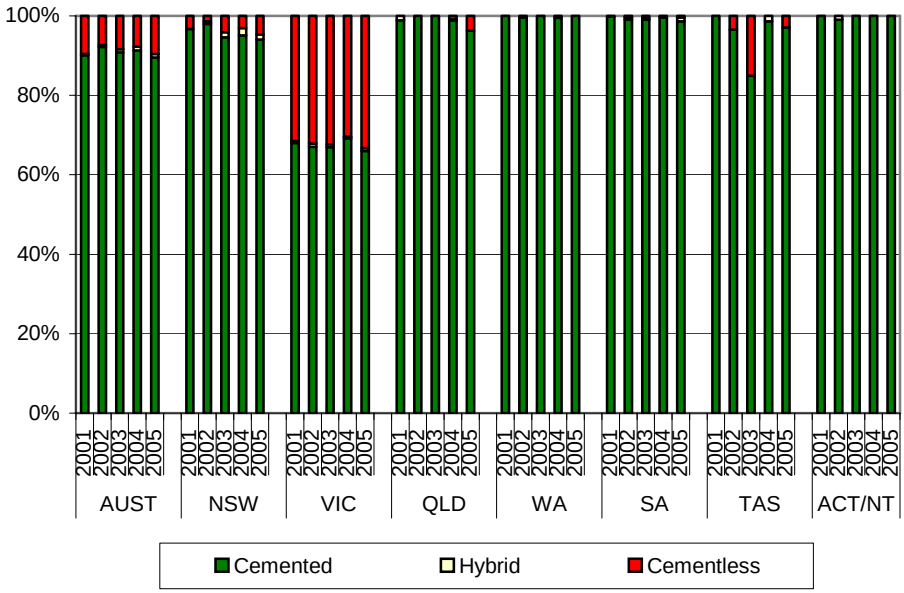
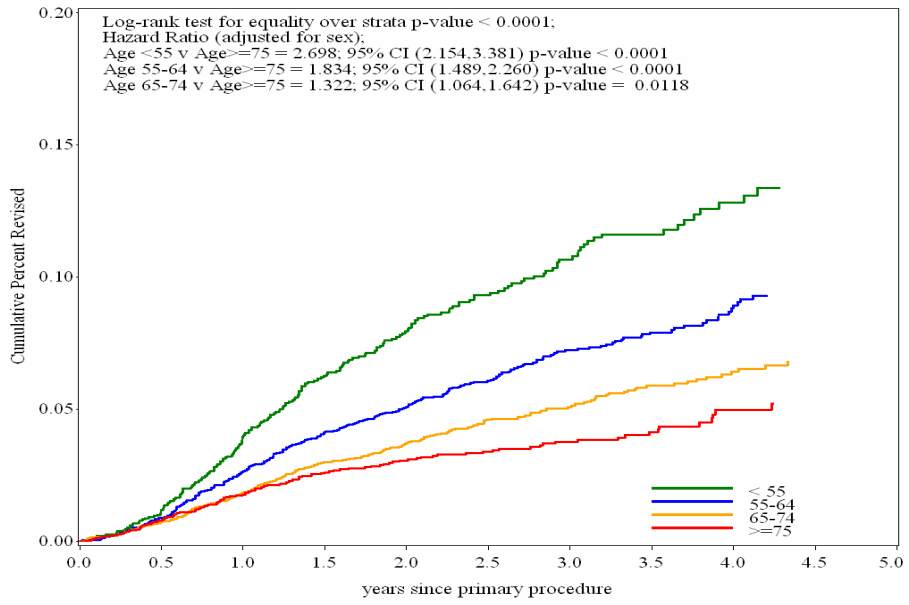


Table KU5: Primary Unicompartmental Knee Procedures Requiring Revision by Age (primary diagnosis OA)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<55	200	2471	8.1	5539	3.6	(3.13, 4.15)
55-64	319	5831	5.5	13097	2.4	(2.18, 2.72)
65-74	247	5908	4.2	14172	1.7	(1.53, 1.97)
75+	122	3953	3.1	9182	1.3	(1.10, 1.59)
Total	**888**	**18163**	**4.9**	**41989**	**2.1**	**(1.98, 2.26)**

Figure KU3: Cumulative percentage revision of Unicompartmental Procedures by Age (primary diagnosis OA)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
<55	2471	2158	1852	1579	1310	1060	801	538	350	163	75
55-64	5831	5153	4397	3754	3133	2450	1839	1275	776	376	151
65-74	5908	5285	4645	4038	3469	2809	2124	1490	916	479	180
75+	3953	3543	3088	2662	2200	1777	1316	908	530	256	118

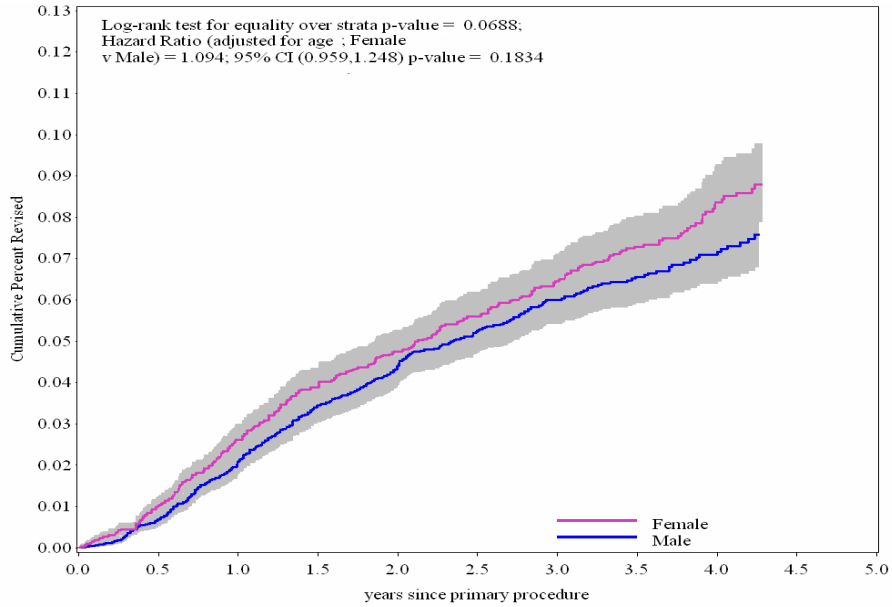
Table KU6: Yearly cumulative percentage revision of Unicompartmental Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
<55	3.94 (3.18, 4.86)	7.94 (6.80, 9.27)	10.7 (9.25, 12.29)	12.8 (11.05, 14.82)
55-64	2.61 (2.20, 3.09)	5.07 (4.46, 5.76)	7.23 (6.43, 8.13)	8.80 (7.77, 9.96)
65-74	1.83 (1.50, 2.24)	3.71 (3.20, 4.29)	5.07 (4.43, 5.79)	6.41 (5.58, 7.35)
75+	1.76 (1.37, 2.25)	3.05 (2.50, 3.71)	3.76 (3.11, 4.54)	4.96 (4.02, 6.10)

Table KU7: Primary Unicompartmental Knee Procedures Requiring Revision by Sex (primary diagnosis OA)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	456	8825	5.2	20284	2.2	(2.05, 2.46)
Male	432	9338	4.6	21705	2.0	(1.81, 2.19)
Total	**888**	**18163**	**4.9**	**41989**	**2.1**	**(1.98, 2.26)**

Figure KU4: Cumulative percentage revision of Unicompartmental Procedures by Sex (primary diagnosis OA)



Sex	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Female	8825	7840	6738	5825	4857	3907	2932	2037	1236	618	253
Male	9338	8299	7244	6208	5255	4189	3148	2174	1336	656	271

Table KU8: Yearly cumulative percentage revision of Unicompartmental Procedures by Sex

Sex	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Female	2.61 (2.28, 2.99)	4.74 (4.27, 5.27)	6.45 (5.84, 7.11)	8.36 (7.53, 9.28)
Male	2.07 (1.78, 2.41)	4.39 (3.94, 4.90)	6.00 (5.43, 6.63)	7.09 (6.40, 7.86)

Table KU9: Primary Unicompartmental Knee Procedures Requiring Revision by Sex and Age (primary diagnosis OA)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <55	109	1416	7.7	3177	3.4	(2.82, 4.14)
Female 55-64	155	2803	5.5	6154	2.5	(2.14, 2.95)
Female 65-74	133	2695	4.9	6499	2.0	(1.71, 2.43)
Female >= 75	59	1911	3.1	4454	1.3	(1.01, 1.71)
Males by Age						
Male <55	91	1055	8.6	2362	3.9	(3.10, 4.73)
Male 55-64	164	3028	5.4	6943	2.4	(2.01, 2.75)
Male 65-74	114	3213	3.5	7673	1.5	(1.23, 1.78)
Male >= 75	63	2042	3.1	4727	1.3	(1.02, 1.71)
Total	**888**	**18163**	**4.9**	**41989**	**2.1**	**(1.98, 2.26)**

Figure KU5: Cumulative percentage revision of Unicompartmental Procedures by Females

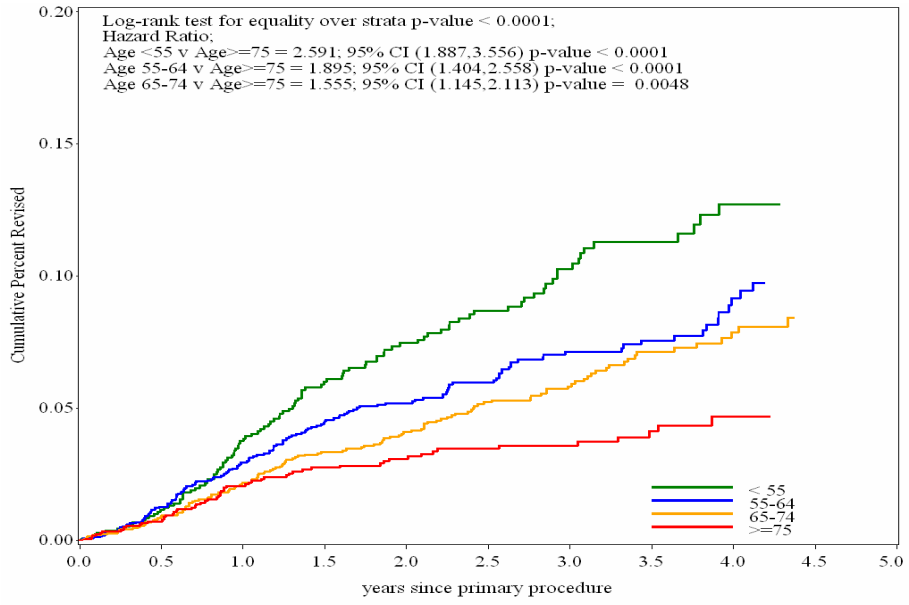
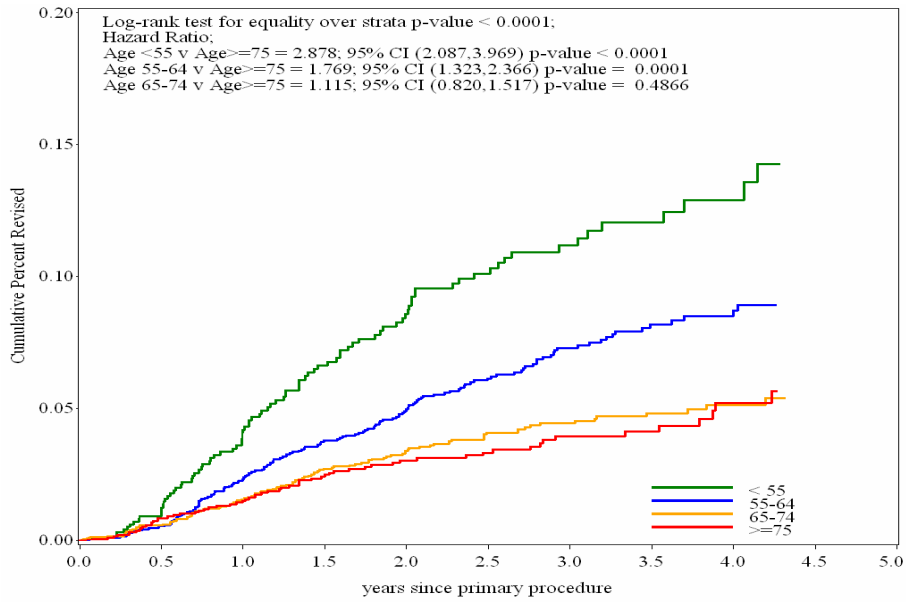


Figure KU6: Cumulative percentage revision of Unicompartmental Procedures by Males



Sex and Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Females by Age											
Female <55	1416	1236	1054	910	747	604	461	312	212	100	48
Female 55-64	2803	2463	2076	1769	1450	1148	845	590	339	168	60
Female 65-74	2695	2416	2114	1847	1588	1293	990	695	428	229	85
Female >= 75	1911	1725	1494	1299	1072	862	636	440	257	121	60
Males by Age											
Male <55	1055	922	798	669	563	456	340	226	138	63	27
Male 55-64	3028	2690	2321	1985	1683	1302	994	685	437	208	91
Male 65-74	3213	2869	2531	2191	1881	1516	1134	795	488	250	95
Male >= 75	2042	1818	1594	1363	1128	915	680	468	273	135	58

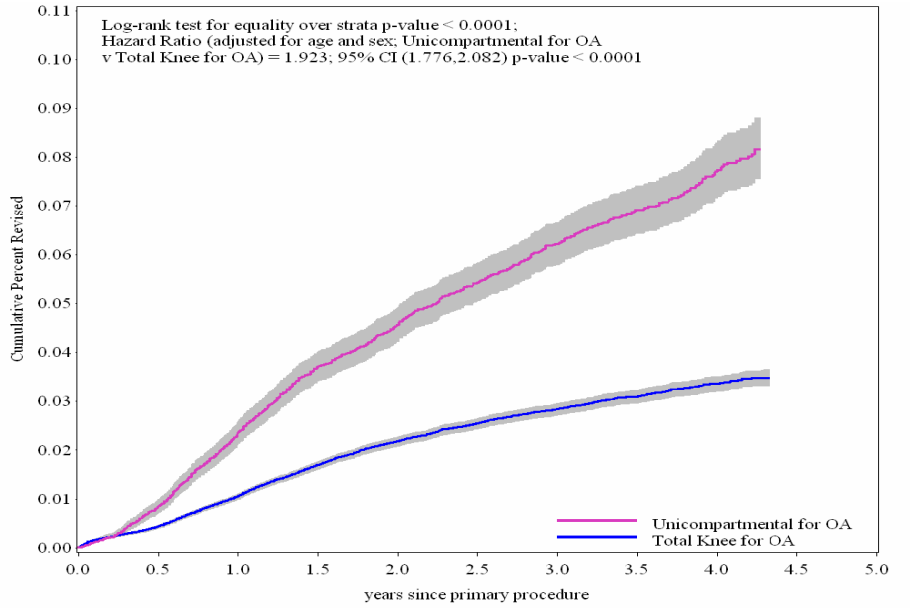
Table KU10: Yearly cumulative percentage revision of Unicompartmental Procedures by Sex and Age

Sex and Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Females by Age				
Female <55	3.75 (2.81, 4.99)	7.46 (6.03, 9.21)	10.3 (8.44, 12.47)	12.7 (10.38, 15.50)
Female 55-64	2.95 (2.34, 3.70)	5.19 (4.33, 6.21)	7.13 (6.02, 8.44)	9.16 (7.57, 11.07)
Female 65-74	2.18 (1.66, 2.85)	4.09 (3.33, 5.02)	5.82 (4.83, 7.00)	7.87 (6.52, 9.49)
Female >= 75	2.05 (1.48, 2.85)	3.07 (2.33, 4.06)	3.57 (2.73, 4.66)	4.68 (3.48, 6.27)
Males by Age				
Male <55	4.19 (3.06, 5.71)	8.58 (6.83, 10.75)	11.2 (9.07, 13.76)	12.9 (10.41, 15.93)
Male 55-64	2.30 (1.79, 2.95)	4.95 (4.14, 5.93)	7.29 (6.20, 8.57)	8.50 (7.21, 10.01)
Male 65-74	1.55 (1.15, 2.07)	3.38 (2.74, 4.17)	4.43 (3.64, 5.37)	5.13 (4.19, 6.27)
Male >= 75	1.48 (1.02, 2.16)	3.03 (2.29, 4.00)	3.94 (3.02, 5.15)	5.21 (3.88, 6.98)

Table KU11: Revision of Unicompartmental and Total Knees (primary diagnosis Osteoarthritis)

Type of knee replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Total Knee for OA	2178	104107	2.1	232218	0.9	(0.90, 0.98)
Unicompartmental for OA	888	18163	4.9	41989	2.1	(1.98, 2.26)
Total	**3066**	**122270**	**2.5**	**274207**	**1.1**	**(1.08, 1.16)**

Figure KU7: Cumulative percentage revision of Unicompartmental and Total Knees (primary diagnosis Osteoarthritis)



Type of knee replacement	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Total Knee	104107	90623	77018	64997	53368	42996	32602	23645	14866	8203	3814
Unicompartmental	18163	16139	13982	12033	10112	8096	6080	4211	2572	1274	524

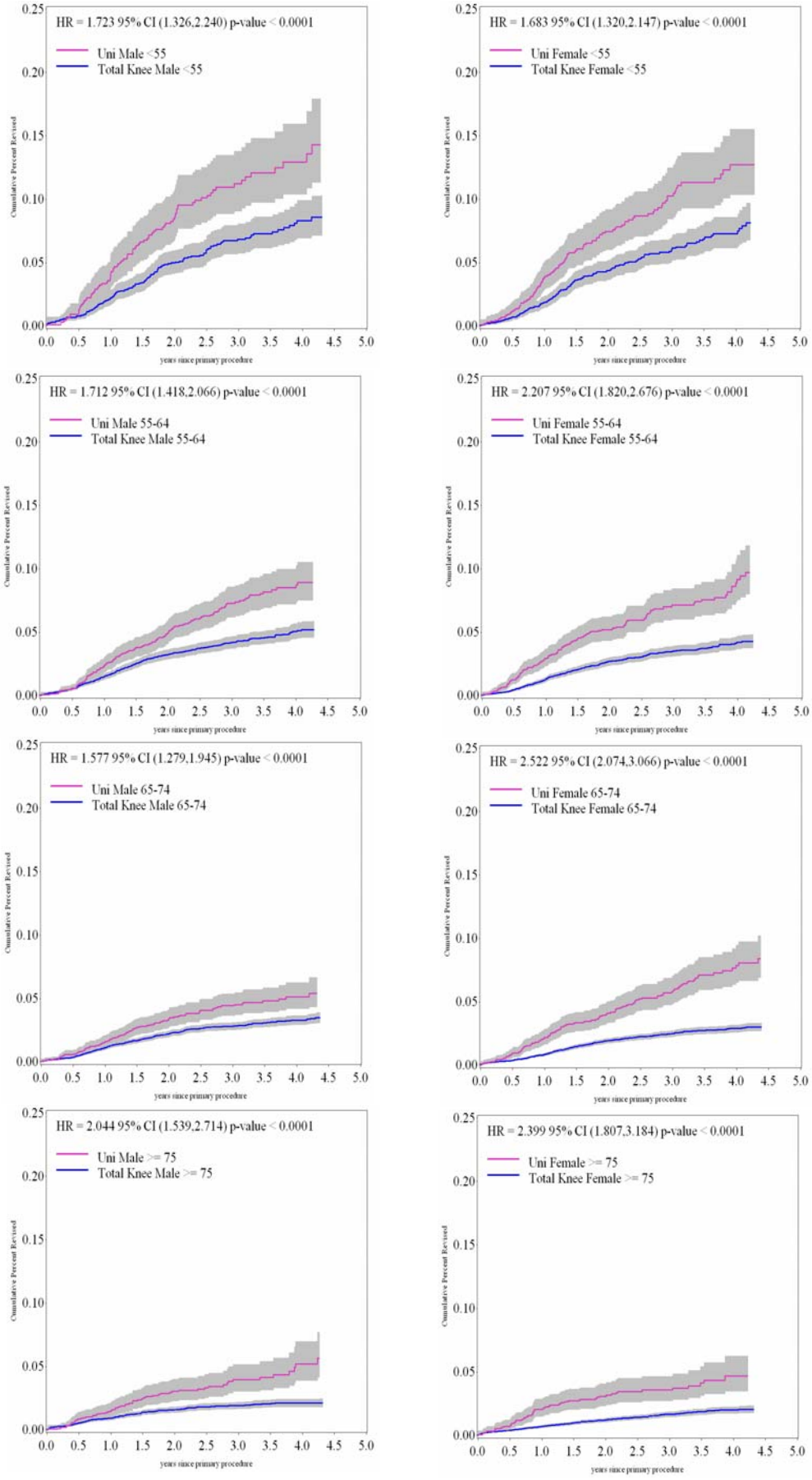
Table KU12: Yearly cumulative percentage revision of Unicompartmental Procedures and Total Knee (primary diagnosis Osteoarthritis)

Type of knee replacement	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Total Knee	1.06 (0.99, 1.13)	2.18 (2.08, 2.29)	2.84 (2.72, 2.97)	3.36 (3.21, 3.52)
Unicompartmental	2.35 (2.12, 2.60)	4.56 (4.23, 4.92)	6.22 (5.80, 6.67)	7.71 (7.16, 8.29)

Table KU13: Revision of Total Knee and Unicompartmental by Sex and Age (primary diagnosis Osteoarthritis)

Type of knee replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females for OA						
Total Knee <55	160	3600	4.4	7854	2.0	(1.73, 2.38)
Uni <55	109	1416	7.7	3177	3.4	(2.82, 4.14)
Total Knee 55-64	310	12625	2.5	27281	1.1	(1.01, 1.27)
Uni 55-64	155	2803	5.5	6154	2.5	(2.14, 2.95)
Total Knee 65-74	412	22300	1.8	50771	0.8	(0.74, 0.89)
Uni 65-74	133	2695	4.9	6499	2.0	(1.71, 2.43)
Total Knee >= 75	255	20764	1.2	46257	0.6	(0.49, 0.62)
Uni >= 75	59	1911	3.1	4454	1.3	(1.01, 1.71)
Males for OA						
Total Knee <55	145	2942	4.9	6527	2.2	(1.87, 2.61)
Uni <55	91	1055	8.6	2362	3.9	(3.10, 4.73)
Total Knee 55-64	322	10617	3.0	23474	1.4	(1.23, 1.53)
Uni 55-64	164	3028	5.4	6943	2.4	(2.01, 2.75)
Total Knee 65-74	376	17435	2.2	39762	0.9	(0.85, 1.05)
Uni 65-74	114	3213	3.5	7673	1.5	(1.23, 1.78)
Total Knee >= 75	198	13824	1.4	30293	0.7	(0.57, 0.75)
Uni >= 75	63	2042	3.1	4727	1.3	(1.02, 1.71)

Figures KU8-15: Cumulative percentage revision of Unicompartmental and Total Knees for Osteoarthritis by Sex and Age



Type by Sex and Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Females for OA											
Total Knee <55	3600	3150	2671	2209	1804	1422	1087	751	464	248	116
Uni <55	1416	1236	1054	910	747	604	461	312	212	100	48
Total Knee 55-64	12625	10902	9181	7667	6266	4995	3710	2626	1614	876	400
Uni 55-64	2803	2463	2076	1769	1450	1148	845	590	339	168	60
Total Knee 65-74	22300	19529	16673	14113	11647	9525	7220	5341	3390	1945	911
Uni 65-74	2695	2416	2114	1847	1588	1293	990	695	428	229	85
Total Knee >= 75	20764	18069	15342	13030	10652	8565	6464	4697	2925	1596	711
Uni >= 75	1911	1725	1494	1299	1072	862	636	440	257	121	60
Males for OA											
Total Knee <55	2942	2545	2172	1851	1524	1193	899	668	424	212	106
Uni <55	1055	922	798	669	563	456	340	226	138	63	27
Total Knee 55-64	10617	9186	7805	6529	5365	4382	3343	2394	1483	794	386
Uni 55-64	3028	2690	2321	1985	1683	1302	994	685	437	208	91
Total Knee 65-74	17435	15302	13145	11121	9160	7365	5675	4139	2646	1450	698
Uni 65-74	3213	2869	2531	2191	1881	1516	1134	795	488	250	95
Total Knee >= 75	13824	11940	10029	8477	6950	5549	4204	3029	1920	1082	486
Uni >= 75	2042	1818	1594	1363	1128	915	680	468	273	135	58

Table KU14: Yearly cumulative percentage revision of Unicompartmental Procedures by Sex and Age

Type by Sex and Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Females for OA				
Total Knee <55	1.85 (1.43, 2.39)	4.37 (3.65, 5.23)	6.06 (5.13, 7.15)	7.29 (6.15, 8.63)
Uni <55	3.75 (2.81, 4.99)	7.46 (6.03, 9.21)	10.3 (8.44, 12.47)	12.7 (10.38, 15.50)
Total Knee 55-64	1.27 (1.07, 1.50)	2.69 (2.37, 3.05)	3.51 (3.12, 3.95)	4.19 (3.69, 4.75)
Uni 55-64	2.95 (2.34, 3.70)	5.19 (4.33, 6.21)	7.13 (6.02, 8.44)	9.16 (7.57, 11.07)
Total 65-74	0.84 (0.72, 0.98)	1.93 (1.73, 2.16)	2.47 (2.23, 2.74)	2.88 (2.59, 3.20)
Uni 65-74	2.18 (1.66, 2.85)	4.09 (3.33, 5.02)	5.82 (4.83, 7.00)	7.87 (6.52, 9.49)
Total Knee >= 75	0.69 (0.58, 0.82)	1.21 (1.05, 1.40)	1.68 (1.47, 1.92)	2.00 (1.74, 2.29)
Uni >= 75	2.05 (1.48, 2.85)	3.07 (2.33, 4.06)	3.57 (2.73, 4.66)	4.68 (3.48, 6.27)
Males for OA				
Total Knee <55	2.22 (1.71, 2.88)	4.98 (4.13, 5.99)	6.83 (5.75, 8.10)	8.32 (6.96, 9.95)
Uni <55	4.19 (3.06, 5.71)	8.58 (6.83, 10.75)	11.2 (9.07, 13.76)	12.9 (10.41, 15.93)
Total Knee 55-64	1.48 (1.25, 1.76)	3.22 (2.84, 3.64)	4.16 (3.70, 4.67)	5.06 (4.48, 5.72)
Uni 55-64	2.30 (1.79, 2.95)	4.95 (4.14, 5.93)	7.29 (6.20, 8.57)	8.50 (7.21, 10.01)
Total Knee 65-74	1.11 (0.96, 1.29)	2.21 (1.97, 2.48)	2.81 (2.52, 3.13)	3.29 (2.94, 3.67)
Uni 65-74	1.55 (1.15, 2.07)	3.38 (2.74, 4.17)	4.43 (3.64, 5.37)	5.13 (4.19, 6.27)
Total Knee >= 75	0.91 (0.76, 1.10)	1.58 (1.36, 1.83)	1.91 (1.65, 2.21)	2.11 (1.81, 2.45)
Uni >= 75	1.48 (1.02, 2.16)	3.03 (2.29, 4.00)	3.94 (3.02, 5.15)	5.21 (3.88, 6.98)

Table KU15: Unicompartmental Primary Knee Procedures requiring Revision

Model	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
AMC	19	267	7.1	337	5.6	(3.40, 8.81)
Active Knee	2	239	0.8	99	2.0	(0.24, 7.27)
Advance	5	30	16.7	46	10.8	(3.51, 25.23)
Allegretto Uni	86	1412	6.1	3907	2.2	(1.76, 2.72)
balanSys	5	152	3.3	119	4.2	(1.36, 9.81)
Eius	4	94	4.3	134	3.0	(0.81, 7.65)
Endo-Model Sled	12	523	2.3	701	1.7	(0.88, 2.99)
GRU	26	944	2.8	1465	1.8	(1.16, 2.60)
Genesis	50	1071	4.7	1984	2.5	(1.87, 3.32)
HLS Uni Evolution	0	22	0.0	22	0.0	(0.00, 16.74)
LCS	4	26	15.4	118	3.4	(0.93, 8.69)
M/G	60	1626	3.7	3893	1.5	(1.18, 1.98)
Natural Knee	16	143	11.2	414	3.9	(2.21, 6.27)
Oxford 3	361	6589	5.5	16835	2.1	(1.93, 2.38)
PFC Sigma	11	137	8.0	600	1.8	(0.92, 3.28)
Preserv-Fixed	78	1440	5.4	2855	2.7	(2.16, 3.41)
Preserv-Sliding	50	369	13.6	893	5.6	(4.16, 7.38)
Repicci	69	1987	3.5	5175	1.3	(1.04, 1.69)
UC-Plus	1	43	2.3	159	0.6	(0.02, 3.50)
Unix	45	1213	3.7	2821	1.6	(1.16, 2.13)
ZUK	0	71	0.0	27	0.0	(0.00, 13.47)
Total	**904**	**18398**	**4.9**	**42605**	**2.1**	**(1.99, 2.26)**

Table KU16: Comparison of Unicompartmental Primary Knee Procedures with Oxford

Model	*Hazard Ratio*	*95% CI for Hazard Ratio*	*Pr > Chi-Square*
AMC	2.355	(1.478,3.751)	0.0003
Active knee	1.147	(0.282,4.659)	0.8477
Advance	5.302	(2.189,12.844)	0.0002
Allegretto	1.019	(0.805,1.289)	0.8765
balanSys	1.978	(0.812,4.817)	0.1332
Eius	0.986	(0.366,2.655)	0.9784
Endo Model Sled	0.832	(0.467,1.483)	0.5330
GRU	0.800	(0.536,1.195)	0.2764
Genesis	1.166	(0.866,1.569)	0.3118
LCS	1.637	(0.583,4.595)	0.3497
M/G	0.718	(0.546,0.943)	0.0174
Natural Knee	1.768	(1.071,2.92)	0.0260
Pfcsigma	0.732	(0.4,1.342)	0.3131
Preserv-Fixed	1.198	(0.937,1.533)	0.1493
Preserv- Mobile	2.169	(1.603,2.935)	<.0001
Repicci	0.638	(0.493,0.826)	0.0006
UC-Plus	0.314	(0.044,2.234)	0.2470
Unix	0.662	(0.485,0.905)	0.0096
Oxford 3	1.000		

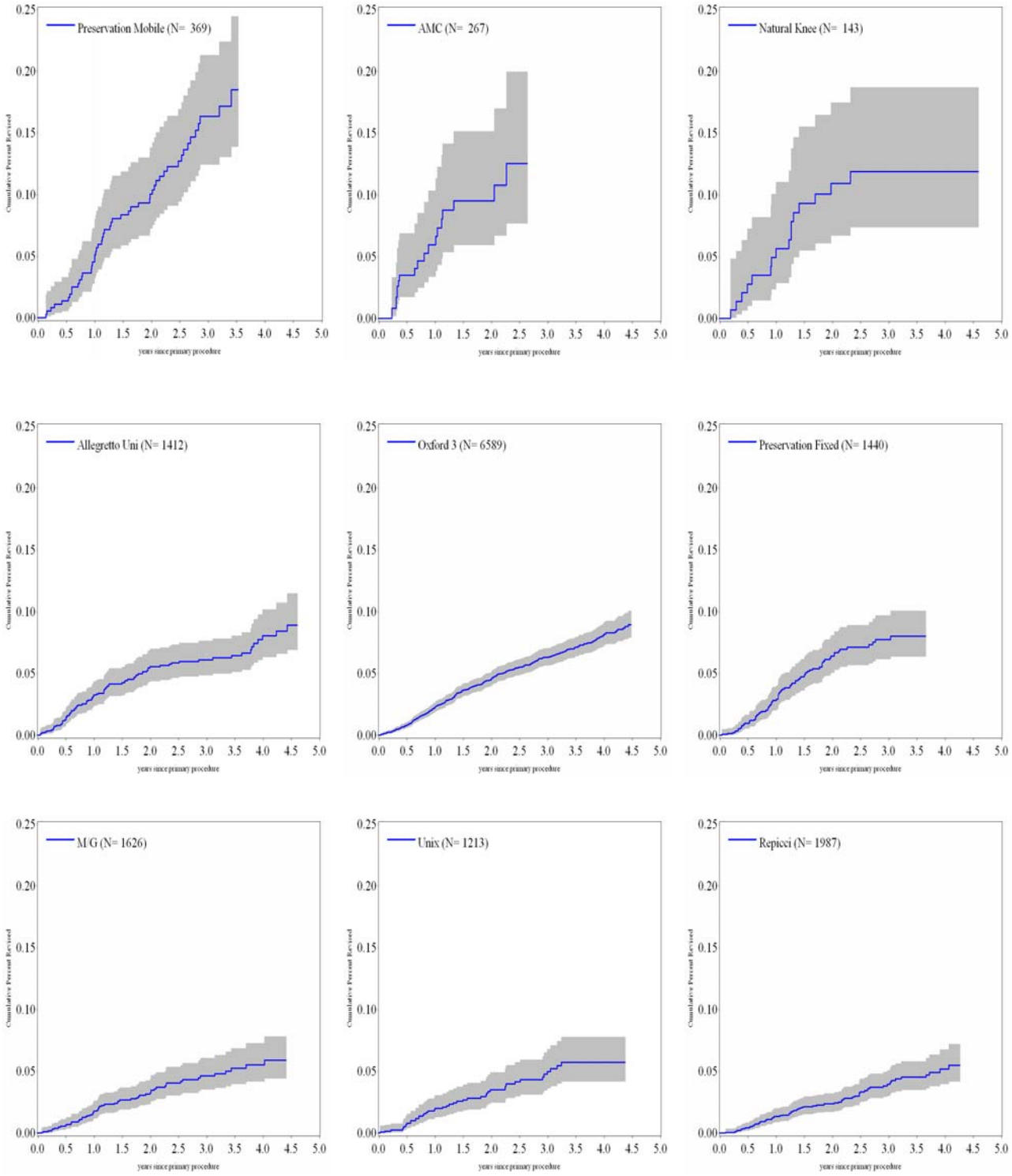
Table KU17: Unicompartmental Primary Knee Procedures requiring Revision
Individual and combined revision for 3 comparators

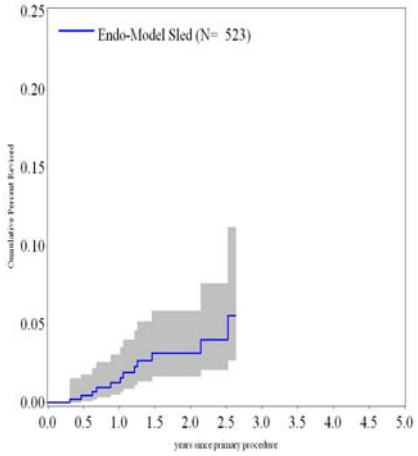
Model	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Unix	45	1213	3.7	2821	1.6	(1.16, 2.13)
Repicci	69	1987	3.5	5175	1.3	(1.04, 1.69)
M/G	60	1626	3.7	3893	1.5	(1.18, 1.98)
Total	**174**	**4826**	**3.6**	**11889**	**1.5**	**(1.25, 1.70)**

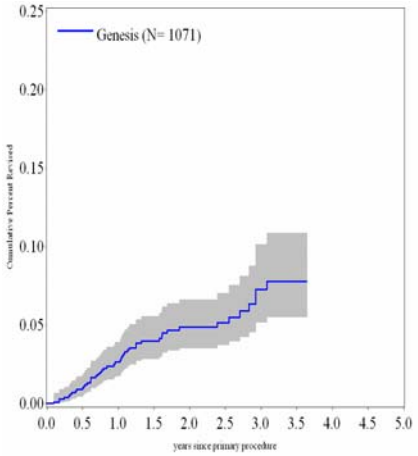
Table KU18: Comparison of Unicompartmental Primary Knee Procedures with 3 comparators M/G, Unix and Repicci

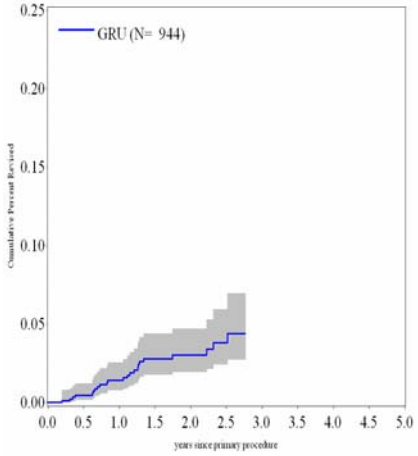
Model	*Hazard Ratio*	*95% CI for Hazard Ratio*	*Pr > Chi-Square*
AMC	3.618	(2.237,5.852)	<.0001
Active Knee	1.813	(0.44,7.47)	0.4101
Advance	7.914	(3.23,19.387)	<.0001
Allegretto	1.513	(1.168,1.961)	0.0017
balanSys	2.915	(1.181,7.192)	0.0202
Eius	1.543	(0.567,4.2)	0.3960
Endo Model Sled	1.236	(0.684,2.231)	0.4829
GRU	1.218	(0.802,1.85)	0.3557
Genesis	1.749	(1.274,2.4)	0.0005
LCS	2.063	(0.66,6.445)	0.2129
Natural Knee	2.612	(1.56,4.371)	0.0003
Oxford 3	1.491	(1.244,1.787)	<.0001
PFC Sigma	1.101	(0.591,2.053)	0.7618
Preserv-Fixed	1.795	(1.372,2.348)	<.0001
Preserv-Mobile	3.337	(2.416,4.608)	<.0001
UC Plus	0.457	(0.064,3.266)	0.4352
M/G, Unix,Repicci	1.000		

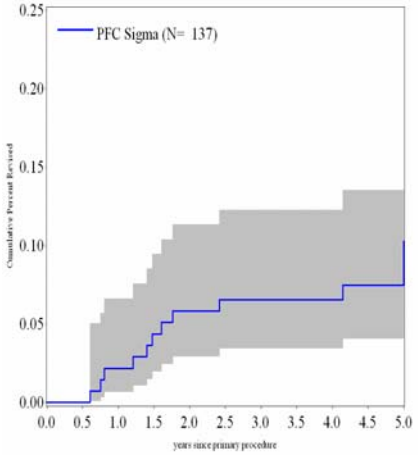
Figures KU16-28: Cumulative percentage revision of Unicompartmental Knee Prostheses











Model	***Number at risk at start of the period***										
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***	***4.5***	***5.0***
Active Knee	239	77	15								
Allegretto Uni	1412	1307	1199	1089	975	836	644	480	298	164	87
AMC	267	194	136	105	75	33					
Endo-Model Sled	523	417	310	200	133	63	32	10	1		
Genesis	1071	929	750	603	451	281	191	126	64	32	15
GRU	944	801	641	485	349	174	38				
M/G	1626	1486	1295	1099	913	743	562	392	257	147	62
Natural Knee	143	138	130	122	109	88	70	48	34	18	3
Oxford 3	6589	5998	5345	4747	4090	3441	2686	1944	1221	644	289
PFC Sigma	137	137	134	131	129	128	128	125	113	64	32
Preservation Fixed	1440	1263	1068	886	685	511	336	174	76	11	
Preservation Mobile	369	350	326	294	256	194	133	39	10		
Repicci	1987	1888	1705	1510	1304	1089	866	594	321	102	12
Unix	1213	1063	926	801	675	551	420	301	200	103	26

Table KU19: Yearly cumulative percentage revision of Unicompartmental Procedures by Model

Model	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 year*
Allegretto Uni	3.26 (2.43, 4.37)	5.56 (4.41, 6.99)	6.13 (4.90, 7.65)	8.07 (6.36, 10.21)	
AMC	5.97 (3.40, 10.37)	9.56 (5.97, 15.13)			
Endo-Model Sled	1.28 (0.53, 3.07)	3.16 (1.68, 5.89)			
Genesis	2.64 (1.77, 3.92)	4.87 (3.56, 6.65)	7.28 (5.20, 10.15)		
GRU	1.42 (0.79, 2.56)	3.04 (1.95, 4.71)			
M/G	1.80 (1.23, 2.63)	3.28 (2.43, 4.41)	4.63 (3.53, 6.07)	5.53 (4.19, 7.28)	
Natural Knee	5.68 (2.88, 11.03)	10.9 (6.72, 17.47)	11.9 (7.43, 18.70)	11.9 (7.43, 18.70)	
Oxford 3	2.27 (1.92, 2.68)	4.58 (4.05, 5.17)	6.32 (5.66, 7.05)	8.15 (7.29, 9.11)	
PFC Sigma	2.19 (0.71, 6.63)	5.84 (2.96, 11.34)	6.57 (3.47, 12.24)	6.57 (3.47, 12.24)	10.3 (5.20, 19.88)
Preservation Fixed	2.83 (2.04, 3.92)	6.42 (5.08, 8.09)	7.77 (6.20, 9.72)		
Preservation Mobile	5.12 (3.26, 8.00)	10.0 (7.28, 13.79)	16.3 (12.44, 21.31)		
Repicci	1.35 (0.91, 1.99)	2.37 (1.74, 3.20)	3.94 (3.05, 5.09)	5.21 (4.00, 6.76)	
Unix	2.01 (1.31, 3.06)	3.51 (2.50, 4.93)	4.99 (3.65, 6.82)	5.74 (4.21, 7.79)	

Primary total knee replacement

This report is based on the analysis of 107,802 primary total replacement knee procedures recorded by the Registry with a procedure date prior to the end of 2005. This is an additional 26,241 primary total knee replacement procedures compared to last years report.

Usage

Primary total knee replacement has increased as a proportion of all total knee procedures. In 2003 it was 77.3% of all knee replacements and this has increased to 80.1% in 2005. This trend is evident in all states with the exception of ACT/NT and South Australia where the proportion of primary knee replacement procedures has remained constant. (Figure KG3).

During 2005 the LCS total knee was the most frequently used prosthesis (14.2% of all primary total knee procedures). This has been the situation each year since the Registry commenced data collection. The proportional use of the LCS however is declining and there are a number of other prostheses with similar use (Table KT1and Figure KT1). In 2005 the five most frequently used prostheses accounted for 61.2% of all primary total knee procedures. The next five were used in 25.6% and the remaining 36 prostheses in 13.2% of all primary total knee procedures.

Overall the number of different prostheses used in 2005 reduced by 2 compared to 2004. The number of cementless primary total knee prostheses however increased from 20 in 2004 to 25 in 2005 (Table KT3).

Details of the ten most frequently used prostheses with respect to cement, cementless and hybrid fixation are provided (Tables KT2-4 and Figures KT2-4).

Changes in use with Gender and Age

The proportion of females receiving primary total knee replacement has increased slightly over recent years (56.7% in 2002 to 58.1% in 2005) (Table KT5).

There has been little change in the age distribution of patients receiving primary total knee replacement apart from a small increase in the proportion of 55-64 year olds receiving primary total knees (increased by 3% 2001-2005) and a small decline in the 65-74 year old group (decreased by 1.9% 2001-2005). Other age groups have remained relatively constant (Table KT6).

Fixation

When considering all procedures recorded by the Registry, cement fixation of both the femoral and tibial components is the most common method of fixation (48.7%). Hybrid fixation has been used in 27.5% of all procedures and cementless fixation in 23.8%. Hybrid fixation almost always involves cementing the tibial component (Table KT7). Over the last three years there has been a small increase in cement fixation and a slight decrease in hybrid and cementless fixation (Figure KT5).

Wide variation in the approach to fixation is evident when comparing the various states and territories (Figure KT5). During 2005 cement fixation was used 75.2% of procedures in Queensland. In contrast cement fixation was used in only 6.9% of procedures in Tasmania.

Use of Patella Resurfacing

Nationally over half of all primary total knee procedures do not have a patellar prosthesis inserted (58.5%). This proportion has remained virtually unchanged during the period 2001 to 2005. There is variation in the use of patella resurfacing between states with over 30% difference between some states. In South Australia a patellar resurfacing is not performed in 84.8% of all primary total knee procedures. In New South Wales and Victoria this figure is 51%.

When a patellar resurfacing is undertaken the patellar prosthesis is cemented in 93.3% of cases (Table KT7)

Outcomes Primary Total Knee

Age and Gender

The highest revision rate of 4.7% occurs in the < 55 year age group, compared to all other age groups (2.1 revisions per 100 component years (95%CI 1.89,2.37) (Table KT8) . At 4 years the cumulative revision rate is 7.77% for the <55 year age group, compared to 2.04% for the >75years age group (Hazard ratio (adjusted for sex) <55year age v >75 year age = 3.540 95% CI (3.061, 4.093) p=<0.0001) (Tables KT8 and KT9, Figure KT7).

Males are revised more frequently than females: 2.3% for males compared to 1.9% for females. Revisions per 100 observed component years is 0.9 for females and 1.0 for males. The cumulative percent revised at 4 years is 3.11% for females and 3.69% for males (hazard ratio (adjusted for age); male v female = 1.167; 95% CI (1.072,1.269) p=0.0003 (Tables KT10, KT11, and Figure KT8).

Comparison of revisions for age and sex, shows that males have a higher revision rate than females for all age groups at any time (Table KT12). The revision rates decrease for all age groups from <55 to >75 years for both males and females (Table KT13, Figures KT9 and KT10).

Mobility

The Registry classifies total knee replacements as either fixed or mobile. This refers to the movement of the tibial insert. There are a number of different types of mobile total knee. The insert may rotate, slide or rotate and slide.

The Registry has data on 76,517 fixed and 30,825 mobile primary total knee replacements. There is a small but significantly higher risk of revision when mobile primary total knee prostheses are used. Comparing the two groups the percentage of mobile knees revised is 2.3% and fixed is 1.8%. Revisions per 100 observed component years is 1.0 for mobile knees and 0.8 for fixed knees. The difference in revision rates becomes evident after 12 months and by 4 years 3.66% of mobile knees and 2.92% of fixed knees are revised (hazard ratio (adjusted for age and sex); mobile total knee v. fixed total knee = 1.201; 95% CI (1.097, 1.315) p= 0.0001) (Table KT14, KT15 and Figure KT11).

There is a significant difference in outcomes for the rotating type of mobile knee compared to the fixed type of total knee. The revision rate per 100 component years for the rotating total knee is 1.2 (95%CI 1.14,1.33), compared to 0.8 (95% CI 0.80,0.88) for the fixed total knee (Table KT16).

Stability

The Registry classifies stability in a number of ways. Primary total knee replacements are regarded as minimally, posterior or fully stabilised. In addition there is a fourth category of stability and that is the hinged prosthesis.

There is no difference in the risk of revision if a minimally or posterior stabilised prosthesis is used. At three years the cumulative revision rate of minimally stabilised knees is 2.8% and posterior stabilised is 2.96% (hazard ratio (adjusted for age and sex); posterior stabilised v. minimal= 1.053; 95% CI (0.941, 1.177) p= 0.3688) (Table KT19 and Table KT18 and Figure KT12).

Although there is an apparent difference in the rate of revision of the hinged prosthesis a comparative analysis of this type of prosthesis or the fully stabilised prosthesis has not been undertaken. These prostheses are not routinely used in a primary situation and it is likely that when they are used it is a more complex primary procedure (Table KT17).

Patella Prosthesis v No Patella Prosthesis

In primary total knee replacement the revision rate is higher if a patella is not used. At four years the cumulative revision rate is 3.86% without a patella and 2.67% with a patella. (hazard ratio

(adjusted for age and sex) no patella v patella = 1.433; 95% CI (1.313, 1.564) p <0.0001) (Table KT19 and Table KT20 and Figure KT13).

The main reason for revision when a patellar resurfacing has not been undertaken as part of the primary procedure is pain or patello-femoral pain (28.5%). When a patellar resurfacing has been performed then subsequent revision is usually related to problems with other components in particular to loosening of the tibial or femoral component (36.2%). Pain as a reason for revision is used in only 6.4% of cases (data not shown).

In last year's report the difficulty in interpreting what this means was discussed. The concept of opportunity to revise was raised. In other words, does the higher revision rate when a patella resurfacing has not been performed simply reflect the fact that the surgeon has a choice to undertake a patella resurfacing procedure in an attempt to address ongoing pain following surgery? It could be argued that if this clinical situation occurred following a primary total procedure where a patellar resurfacing had been undertaken, then the surgeon is less likely to proceed with a revision procedure. Alternatively, the higher revision rate may reflect that patients who have not had a patellar resurfacing have a higher incidence of pain following primary total knee replacement. Irrespective of these arguments is the underlying fact that when a patellar resurfacing is undertaken as part of the primary total knee replacement, there is a reduced risk of revision.

Fixation

In determining outcomes related to fixation the Registry has excluded procedures that used cementless Oxinium components. This is a specific group of cementless components with a known high revision rate. Inclusion in this analysis significantly increases the revision rate of cementless fixation. When these components are excluded there is no significant difference in revision rate for cementless, cemented or hybrid procedures (Table KT21 and KT22 and Figure KT14).

Prostheses Types

Variable revision rates for individual prostheses are presented in tables depending on the fixation used. These tables only include prostheses that have over 1000 observed component years as of the 31st December 2005 (Table KT23). Inspection of the cumulative percentage revision tables provides the best indication of comparative outcome. There are 3 prostheses that have less than 2% cumulative percentage revision at 4 years. These are the cemented Nexgen (1.40% Table KT24), the hybrid AGC (1.59% Table KT28) and the cementless Advantim (1.64% Table K26).

As is the case with other prostheses there is variation in outcome of the Nexgen depending on the method of fixation. There are also a number of different varieties of the Nexgen, the Nexgen LPS and the Nexgen LPS Flex. Both of these prostheses, although the performance appears to be reasonable, do not appear to be doing as well as the original Nexgen.

An important feature to notice from the examination of the outcome tables is the revision rates of the group of prostheses classified as 'others'. These are prostheses that have less than 1000 observed component years. This group includes prostheses that are used infrequently or prostheses that are new to the market but as yet have insufficient numbers to be included in the tables. In each of the tables it is apparent that the combined revisions rate of this group of prostheses is higher than the more frequently used prostheses.

Prostheses with a higher than anticipated revision rate

In the 2005 Report, the Registry identified five prostheses with a higher than anticipated rate of revision. These included four prostheses using cementless oxinium femoral components. They were the Genesis II / Fixed bearing, cementless Oxinium femoral component, Genesis II/ Mobile bearing, cementless Oxinium femoral component, Profix / Fixed

bearing, cementless Oxinium femoral component and Profix / Mobile bearing, cementless Oxinium femoral component.

Cementless oxinium femoral components are no longer used but the results have been presented for each of these 4 prostheses to detail the continuing high revision rate (Tables KT29-KT32 and Figures KT15 and KT16). The cumulative percentage revision rate for these four prostheses at 2 years is 30.2%, 49.3%, 32.2% and 27.7% respectively (Table KT30 and Table KT 32). The last of these, the cementless Oxinium femoral Genesis II / mobile bearing, and the cementless Oxinium femoral Profix / mobile bearing component, are cementless oxinium prostheses with mobile bearings with cumulative percentage revisions at three years of 51.7% and 41.3% (Table KT30 and Table KT32).

The fifth primary total knee that was identified as having a higher than anticipated revision rate was the non-oxinium Profix mobile bearing knee. This was in part related to an original design problem with the insert locking screw. The design has now been changed to ensure the screw cannot disengage. The cumulative percentage revision rate of original design at three years is 6.13% (Table KT32).

The Registry has records of 138 Trac total knees, the majority reported as being used from 2000 to 2002. The Trac was not used in 2005, and only one was inserted in 2004. The revision rate for this knee is 8.0%. This represents 2.0 revisions per 100 component years (95%CI 0.98;3.50).

Primary Total Knee Replacement - 1/9/1999 to 31/12/2005

Prosthesis Usage

Table KT1: 10 Most Common Prostheses used in Primary Total Knee

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	LCS (2471)	LCS (3140)	LCS (3179)	LCS (3512)	LCS (3686)
2	Duracon (1843)	Duracon (3010)	Duracon (2839)	Genesis II (3003)	Genesis II (3619)
3	Genesis II (1501)	Nexgen (2017)	Genesis II (2243)	Duracon (2647)	Nexgen (3051)
4	Nexgen (1173)	Genesis II (1835)	Nexgen (2158)	Nexgen (2497)	PFC Sigma (2908)
5	Scorpio (1057)	PFC Sigma (1786)	Scorpio (2109)	PFC Sigma (2473)	Duracon (2647)
6	PFC Sigma (905)	Scorpio (1752)	PFC Sigma (1940)	Scorpio (2133)	Scorpio (2448)
7	Nexgen LPS (591)	Profix (944)	Profix (1193)	Nexgen LPS Flex (1254)	Nexgen LPS Flex (1672)
8	AGC (532)	Nexgen LPS (857)	Natural Knee (1002)	Profix (1202)	Profix (1232)
9	Natural Knee (441)	Natural Knee (811)	Nexgen LPS (901)	Active Knee (822)	Active Knee (762)
10	Kinemax Plus (357)	AGC (633)	Nexgen LPS Flex (685)	Nexgen LPS (749)	Natural Knee (559)
% using 10 Most Common	85.5%	86.4%	84.1%	87%	86.8%
Total N Procedures	12712	19431	21687	23334	26017
Total N Prosthesis Types	49	50	46	48	46

Figure KT1: 5 Most Common Prostheses used in Primary Total Knee

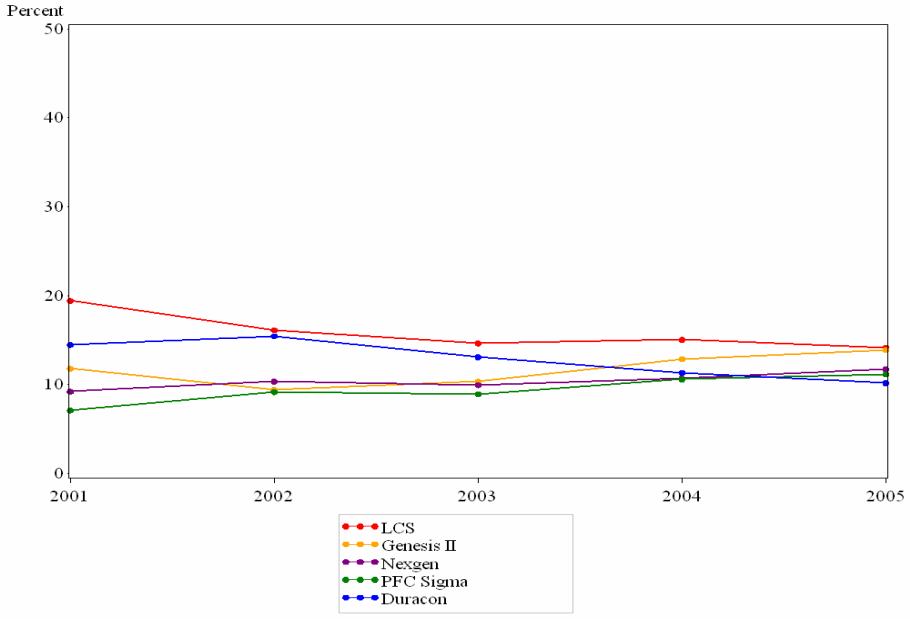


Table KT2: 10 Most Common Prostheses used with Cement Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	LCS (1193)	Genesis II (1341)	Genesis II (1634)	Genesis II (2412)	Genesis II (3006)
2	Genesis II (1041)	LCS (1183)	Duracon (1242)	PFC Sigma (1395)	Nexgen LPS Flex (1644)
3	Duracon (794)	Duracon (1172)	LCS (982)	Nexgen LPS Flex (1246)	PFC Sigma (1579)
4	Nexgen LPS (558)	PFC Sigma (868)	PFC Sigma (840)	Duracon (1209)	Duracon (1186)
5	PFC Sigma (455)	Nexgen LPS (767)	Nexgen LPS (828)	LCS (997)	Nexgen (948)
6	Nexgen (409)	Nexgen (703)	Nexgen (802)	Nexgen (944)	LCS (932)
7	AGC (359)	Scorpio (619)	Scorpio (710)	Profix (713)	Scorpio (789)
8	Kinemax Plus (347)	Profix (516)	Nexgen LPS Flex (682)	Scorpio (711)	Profix (758)
9	Scorpio (344)	AGC (406)	Profix (640)	Nexgen LPS (662)	Nexgen LPS (426)
10	Profix (181)	Kinemax Plus (397)	AGC (394)	AGC (369)	AGC (367)
% using 10 Most Common	87%	87.6%	87.7%	92.1%	89.7%
Total N Procedures	6533	9101	9987	11577	12971
Total N Prosthesis Types	46	41	40	39	42

Figure KT2: 5 Most Common Prostheses used with Cement Fixation

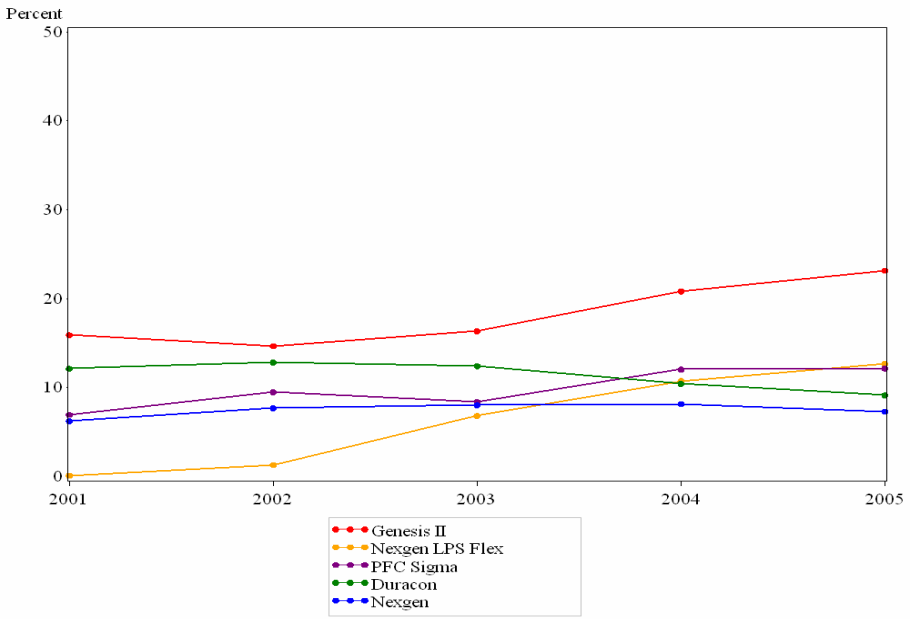


Table KT3: 10 Most Common Prostheses used with Cementless Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	LCS (864)	LCS (1299)	LCS (1468)	LCS (1750)	LCS (1943)
2	Nexgen (402)	Nexgen (753)	Nexgen (784)	Nexgen (790)	Nexgen (1109)
3	Duracon (253)	Duracon (524)	Scorpio (499)	Active Knee (683)	Scorpio (598)
4	Scorpio (210)	Natural Knee (373)	Natural Knee (491)	Scorpio (542)	Active Knee (475)
5	Natural Knee (180)	Scorpio (319)	Active Knee (480)	Duracon (373)	Duracon (441)
6	Genesis II (126)	RBK (229)	Duracon (477)	Natural Knee (370)	PFC Sigma (385)
7	Maxim (108)	PFC Sigma (225)	PFC Sigma (313)	PFC Sigma (321)	RBK (382)
8	Profix (85)	Active Knee (194)	Profix (300)	RBK (274)	Natural Knee (255)
9	Advantim (77)	Profix (190)	RBK (299)	Profix (202)	Profix (211)
10	AMK (61)	Maxim (135)	Maxim (137)	Maxim (84)	Advantim (78)
% using 10 Most Common	91.5%	91.2%	92.5%	95.6%	94.6%
Total N Procedures	2587	4652	5676	5636	6210
Total N Prosthesis Types	21	27	20	20	25

Figure KT3: 5 Most Common Prostheses used with Cementless Fixation

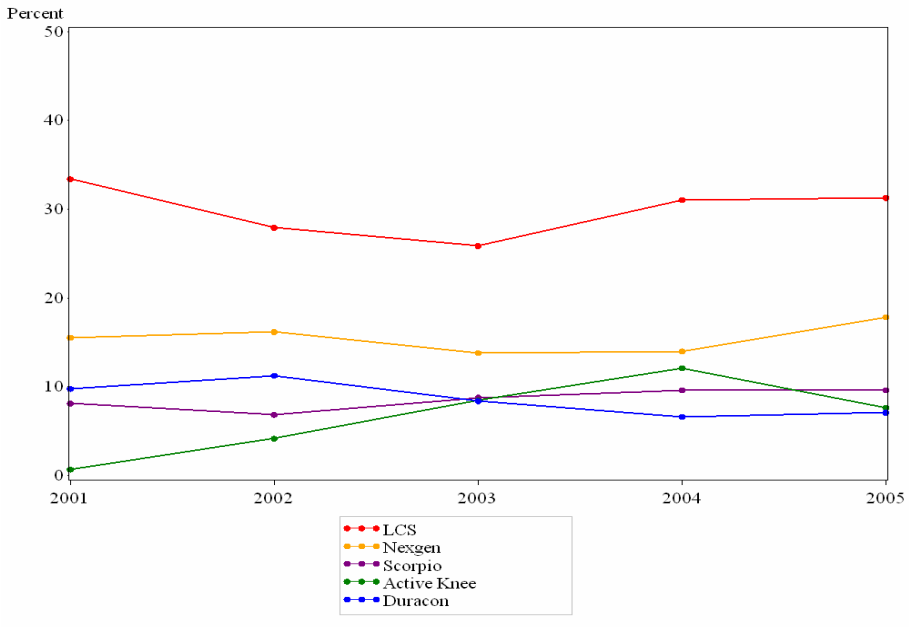


Table KT4: 10 Most Common Prostheses used with Hybrid Fixation

Rank	*2001*	*2002*	*2003*	*2004*	*2005*
1	Duracon (796)	Duracon (1314)	Duracon (1120)	Duracon (1065)	Scorpio (1061)
2	Scorpio (503)	Scorpio (814)	Scorpio (900)	Scorpio (880)	Duracon (1020)
3	LCS (414)	PFC Sigma (693)	PFC Sigma (787)	LCS (765)	Nexgen (994)
4	PFC Sigma (409)	LCS (658)	LCS (729)	Nexgen (763)	PFC Sigma (944)
5	Nexgen (362)	Nexgen (561)	Nexgen (572)	PFC Sigma (757)	LCS (811)
6	Genesis II (334)	Genesis II (384)	Genesis II (482)	Genesis II (509)	Genesis II (559)
7	AGC (173)	Natural Knee (238)	Profix (253)	Profix (287)	Profix (263)
8	Natural Knee (149)	Profix (238)	Maxim (250)	Maxim (283)	Maxim (213)
9	Nexgen MBK (79)	AGC (226)	Natural Knee (237)	Natural Knee (206)	Active Knee (207)
10	Profix (72)	Maxim (105)	AGC (191)	AGC (137)	Natural Knee (175)
% using 10 Most Common	91.6%	92.1%	91.7%	92.3%	91.4%
Total N Procedures	3592	5678	6024	6121	6836
Total N Prosthesis Types	34	30	35	36	32

Figure KT4: 5 Most Common Components used with Hybrid Fixation

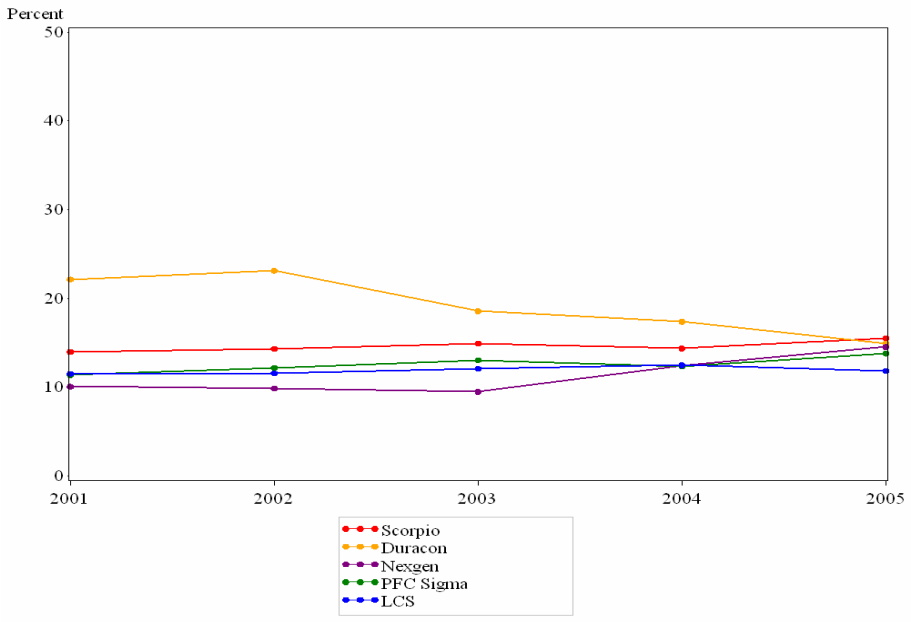


Table KT5: Usage of Primary Total Knee Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	7174	56.4	5538	43.6	12712	100.0
2002	11018	56.7	8413	43.3	19431	100.0
2003	12498	57.6	9189	42.4	21687	100.0
2004	13509	57.9	9825	42.1	23334	100.0
2005	15105	58.1	10911	41.9	26016	100.0

Table KT6: Usage of Primary Total Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2001	835	6.6	2623	20.6	4938	38.8	3909	30.8	407	3.2	12712	100.0
2002	1291	6.6	4290	22.1	7456	38.4	5782	29.8	612	3.1	19431	100.0
2003	1529	7.1	4858	22.4	8225	37.9	6398	29.5	677	3.1	21687	100.0
2004	1577	6.8	5351	22.9	8847	37.9	6854	29.4	705	3.0	23334	100.0
2005	1706	6.6	6135	23.6	9587	36.9	7756	29.8	832	3.2	26016	100.0

Table KT7: Prosthesis Fixation - Primary Total Knee Replacement

Fixation	*Total*		*Patella used*			
			Patella cementless		*Patella cemented*	
	Number	*%*	*Number*	*%†*	*Number*	*%†*
Tibial and femoral cementless	25707	23.8	2631	10.2	5728	22.3
Tibial and femoral cemented	52499	48.7	52	0.1	26114	49.7
Tibial only cemented	28732	26.7	358	1.2	10557	36.7
Femoral only cemented	864	0.8	9	1.0	426	49.3
Total	**107802**	**100.0**	**3050**	**2.8**	**42825**	**39.7**

Note: *†percents shown are row percents out of total number*

Figure KT5: Trends in Prosthesis Fixation – Primary Total Knee by State and Territory

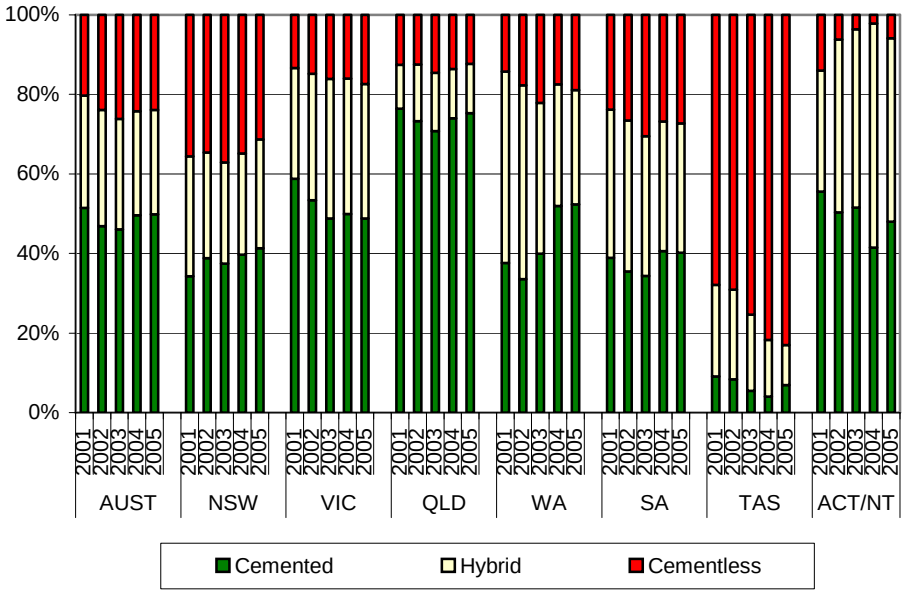


Figure KT6: Trends in Patella Usage and fixation for Primary Total Knee Replacement by State and Territory

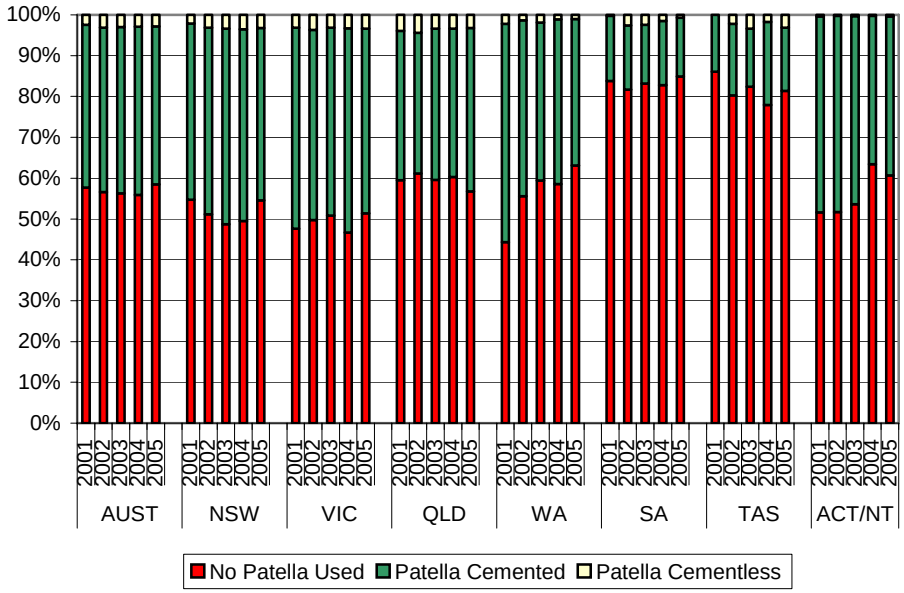
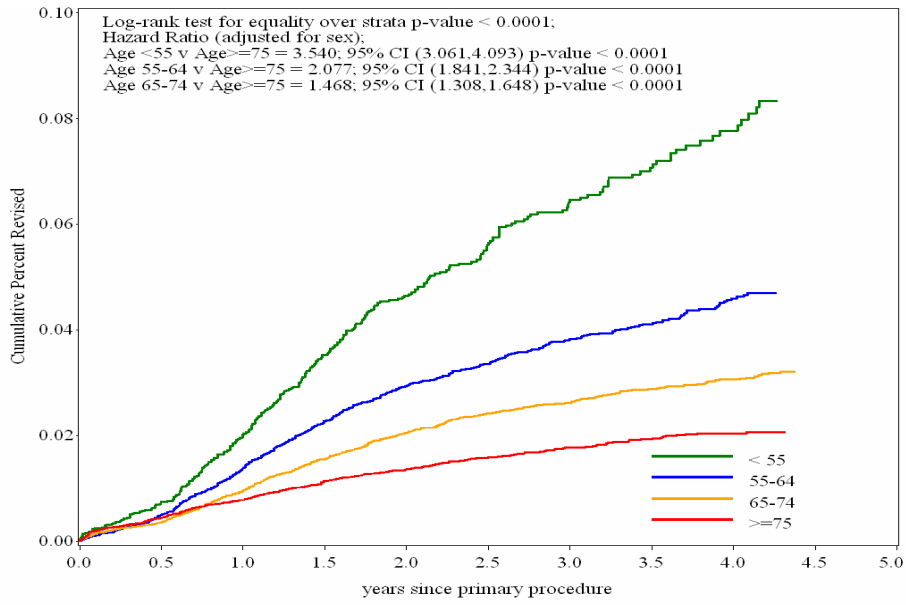


Table KT8: Primary Total Knee Procedures Requiring Revision by Age (primary diagnosis OA)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<55	305	6542	4.7	14381	2.1	(1.89, 2.37)
55-64	632	23242	2.7	50755	1.2	(1.15, 1.35)
65-74	788	39735	2.0	90532	0.9	(0.81, 0.93)
75+	453	34588	1.3	76550	0.6	(0.54, 0.65)
Total	**2178**	**104107**	**2.1**	**232218**	**0.9**	**(0.90, 0.98)**

Figure KT7: Cumulative percentage revision of Primary Total Procedures by Age (primary diagnosis OA)



Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
<55	6542	5695	4843	4060	3328	2615	1986	1419	888	460	222
55-64	23242	20088	16986	14196	11631	9377	7053	5020	3097	1670	786
65-74	39735	34831	29818	25234	20807	16890	12895	9480	6036	3395	1609
75+	34588	30009	25371	21507	17602	14114	10668	7726	4845	2678	1197

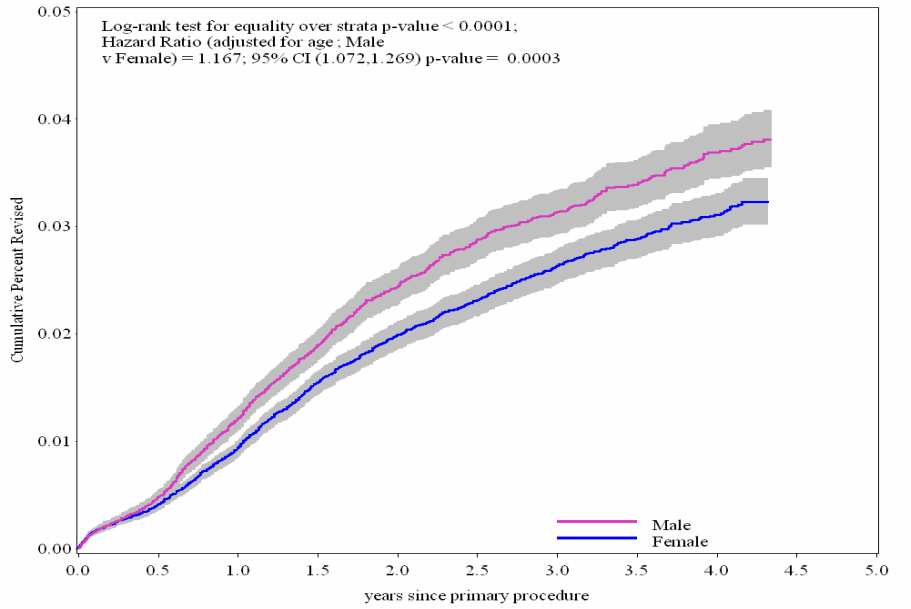
Table KT9: Yearly cumulative percentage revision of Primary Total Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
<55	2.01 (1.68, 2.42)	4.65 (4.08, 5.29)	6.41 (5.69, 7.22)	7.77 (6.86, 8.79)
55-64	1.37 (1.21, 1.54)	2.93 (2.69, 3.20)	3.81 (3.51, 4.14)	4.60 (4.21, 5.02)
65-74	0.96 (0.86, 1.07)	2.05 (1.90, 2.22)	2.62 (2.43, 2.82)	3.06 (2.83, 3.30)
75+	0.78 (0.69, 0.89)	1.36 (1.22, 1.50)	1.77 (1.60, 1.95)	2.04 (1.84, 2.26)

Table KT10: Primary Total Knee Procedures Requiring Revision by Sex

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	1137	59289	1.9	132163	0.9	(0.81, 0.91)
Male	1041	44818	2.3	100055	1.0	(0.98, 1.11)
Total	**2178**	**104107**	**2.1**	**232218**	**0.9**	**(0.90, 0.98)**

Figure KT8: Cumulative percentage revision of Primary Total Procedures by Sex



Sex	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Female	59289	51650	43867	37019	30369	24507	18481	13415	8393	4665	2138
Male	44818	38973	33151	27978	22999	18489	14121	10230	6473	3538	1676

Table KT11: Yearly Cumulative percentage revision of Primary Total Procedures by Sex

Sex	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Female	0.94 (0.86, 1.03)	1.99 (1.86, 2.13)	2.63 (2.47, 2.80)	3.11 (2.91, 3.32)
Male	1.21 (1.11, 1.33)	2.44 (2.28, 2.61)	3.13 (2.93, 3.33)	3.69 (3.45, 3.95)

Table KT12: Primary Total Knee Procedures Requiring Revision by Sex and Age (primary diagnosis OA)

Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <55	160	3600	4.4	7854	2.0	(1.73, 2.38)
Female 55-64	310	12625	2.5	27281	1.1	(1.01, 1.27)
Female 65-74	412	22300	1.8	50771	0.8	(0.74, 0.89)
Female >= 75	255	20764	1.2	46257	0.6	(0.49, 0.62)
Males by Age						
Male <55	145	2942	4.9	6527	2.2	(1.87, 2.61)
Male 55-64	322	10617	3.0	23474	1.4	(1.23, 1.53)
Male 65-74	376	17435	2.2	39762	0.9	(0.85, 1.05)
Male >= 75	198	13824	1.4	30293	0.7	(0.57, 0.75)
Total	**2178**	**104107**	**2.1**	**232218**	**0.9**	**(0.90, 0.98)**

Figure KT9: Cumulative percentage revision of Primary Total Procedures by Females

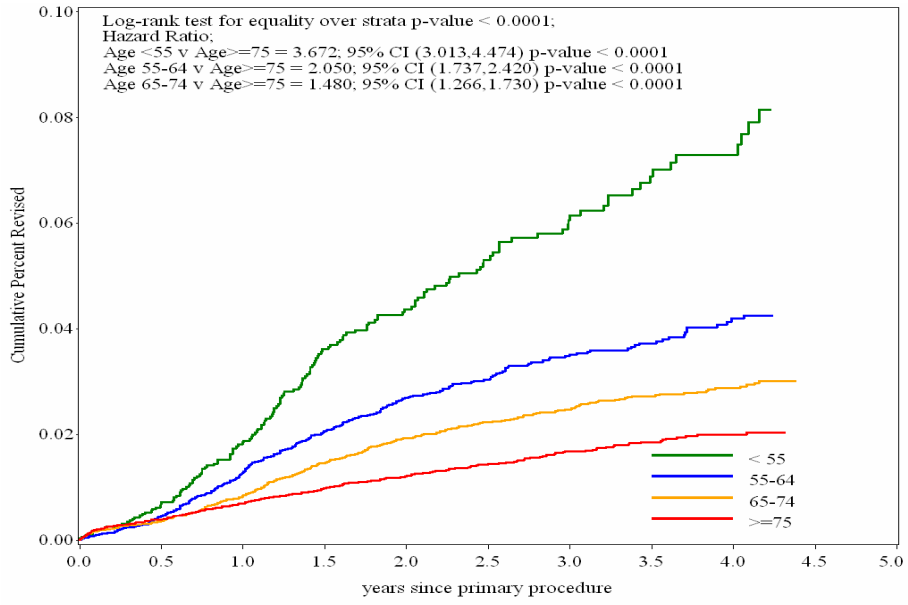
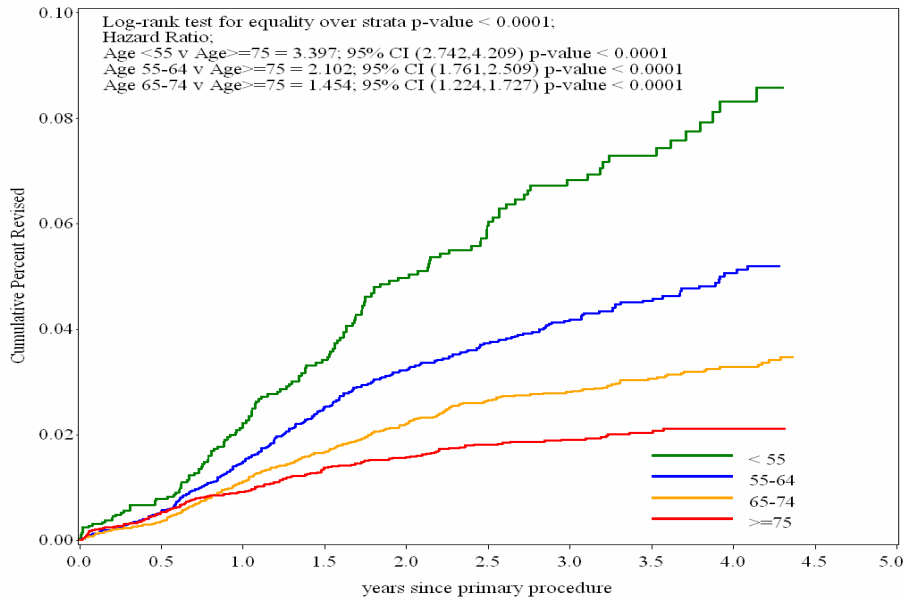


Figure KT10: Cumulative percentage revision of Primary Total Procedures by Males



Sex and Age	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Females by Age											
Female <55	3600	3150	2671	2209	1804	1422	1087	751	464	248	116
Female 55-64	12625	10902	9181	7667	6266	4995	3710	2626	1614	876	400
Female 65-74	22300	19529	16673	14113	11647	9525	7220	5341	3390	1945	911
Female >= 75	20764	18069	15342	13030	10652	8565	6464	4697	2925	1596	711
Males by Age											
Male <55	2942	2545	2172	1851	1524	1193	899	668	424	212	106
Male 55-64	10617	9186	7805	6529	5365	4382	3343	2394	1483	794	386
Male 65-74	17435	15302	13145	11121	9160	7365	5675	4139	2646	1450	698
Male >= 75	13824	11940	10029	8477	6950	5549	4204	3029	1920	1082	486

Table KT13: Yearly cumulative percentage revision of Primary Total Procedures by Sex and Age

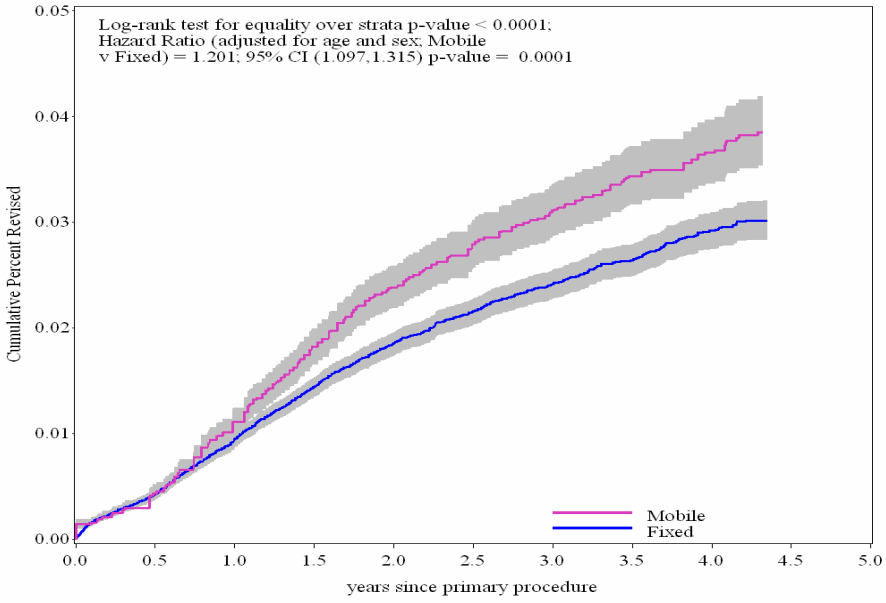
Sex and Age	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Females by Age				
Female <55	1.85 (1.43, 2.39)	4.37 (3.65, 5.23)	6.06 (5.13, 7.15)	7.29 (6.15, 8.63)
Female 55-64	1.27 (1.07, 1.50)	2.69 (2.37, 3.05)	3.51 (3.12, 3.95)	4.19 (3.69, 4.75)
Female 65-74	0.84 (0.72, 0.98)	1.93 (1.73, 2.16)	2.47 (2.23, 2.74)	2.88 (2.59, 3.20)
Female >= 75	0.69 (0.58, 0.82)	1.21 (1.05, 1.40)	1.68 (1.47, 1.92)	2.00 (1.74, 2.29)
Males by Age				
Male <55	2.22 (1.71, 2.88)	4.98 (4.13, 5.99)	6.83 (5.75, 8.10)	8.32 (6.96, 9.95)
Male 55-64	1.48 (1.25, 1.76)	3.22 (2.84, 3.64)	4.16 (3.70, 4.67)	5.06 (4.48, 5.72)
Male 65-74	1.11 (0.96, 1.29)	2.21 (1.97, 2.48)	2.81 (2.52, 3.13)	3.29 (2.94, 3.67)
Male >= 75	0.91 (0.76, 1.10)	1.58 (1.36, 1.83)	1.91 (1.65, 2.21)	2.11 (1.81, 2.45)

Table KT14: Fixed v Mobile Primary Total Knee Procedures requiring Revision

Movement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Fixed	1377	76517	1.8	171021	0.8	(0.76, 0.85)
Mobile	707	30825	2.3	69094	1.0	(0.95, 1.10)
Total	**2084**	**107342**	**1.9**	**240116**	**0.9**	**(0.83, 0.91)**

***Note**: data excluding procedures with cementless Profix and Genesis Oxinium Femoral components*

Figure KT11: Cumulative percentage revision of Fixed and Mobile



Movement	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Fixed	76517	66527	56386	47666	39337	31763	24175	17576	11068	6227	2884
Mobile	30825	26968	23084	19486	15806	12722	9685	7063	4431	2330	1102

Table KT15: Yearly cumulative percentage revision of Fixed and Mobile

Movement	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Fixed	0.94 (0.87, 1.02)	1.85 (1.74, 1.96)	2.41 (2.27, 2.55)	2.92 (2.75, 3.10)
Mobile	1.11 (0.99, 1.24)	2.38 (2.19, 2.59)	3.11 (2.87, 3.36)	3.66 (3.37, 3.97)

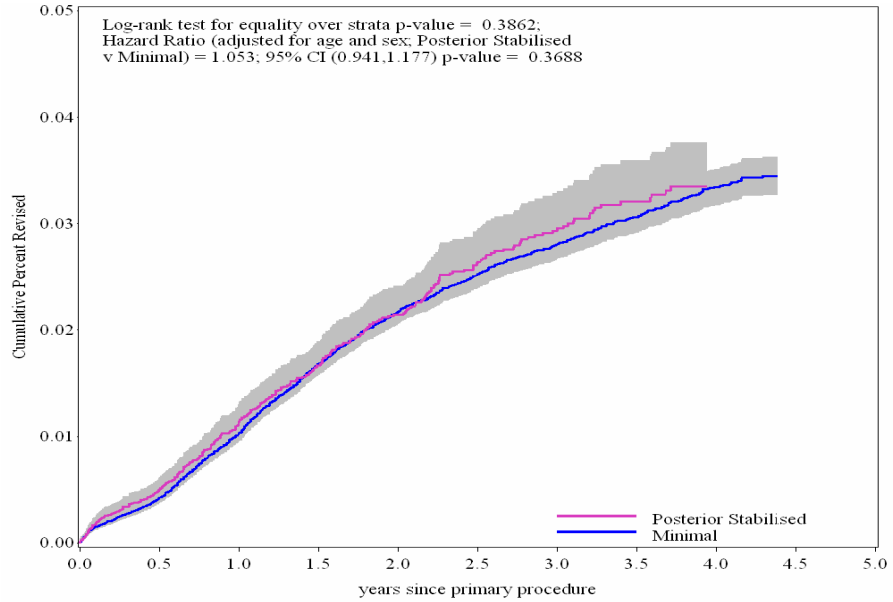
Table KT16: Total Primary Knee Procedures requiring Revision by Movement

Movement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Fixed	1440	76693	1.9	171401	0.8	(0.80, 0.88)
Rotating	707	26625	2.7	57352	1.2	(1.14, 1.33)
Rotating - Sliding	75	3507	2.1	8622	0.9	(0.68, 1.09)
Sliding	30	939	3.2	3655	0.8	(0.55, 1.17)
Unknown	1	38	2.6	116	0.9	(0.02, 4.79)
Total	**2253**	**107802**	**2.1**	**241145**	**0.9**	**(0.90, 0.97)**

Table KT17: Total Primary Knee Procedures requiring Revision by Stability

Stability	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Minimal	1868	88051	2.1	203068	0.9	(0.88, 0.96)
Posterior Stabilised	367	19151	1.9	36815	1.0	(0.90, 1.10)
Fully Stabilised	9	364	2.5	793	1.1	(0.52, 2.15)
Hinged	8	198	4.0	354	2.3	(0.98, 4.46)
Unknown	1	38	2.6	116	0.9	(0.02, 4.79)
Total	**2253**	**107802**	**2.1**	**241145**	**0.9**	**(0.90, 0.97)**

Figure KT12: Cumulative percentage revision of Posterior Stabilised and Minimal



Stability	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Minimal	88094	77377	66514	56885	47219	38429	29397	21499	13634	7496	3521
Posterior Stabilised	19151	16106	12976	10293	7975	6099	4403	3076	1815	1026	450

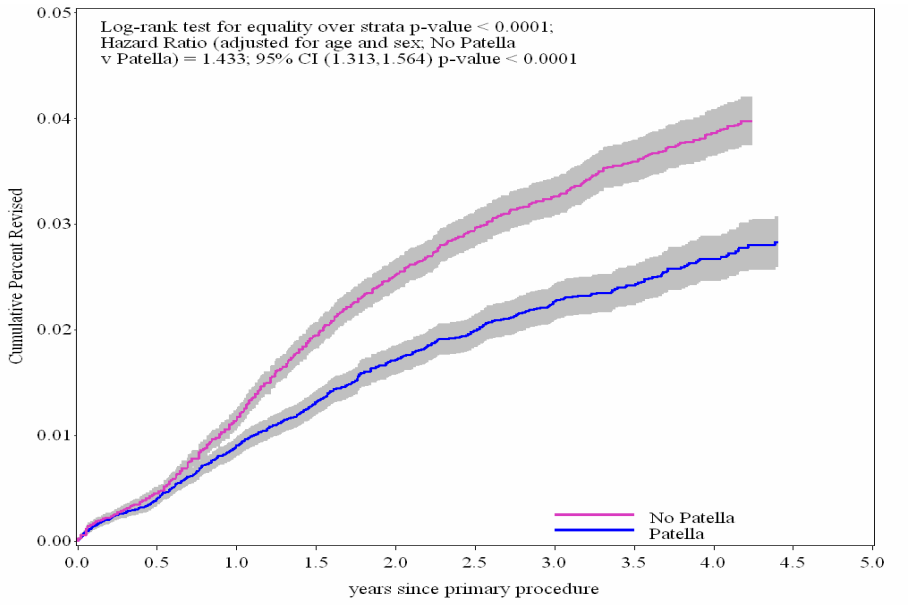
Table KT18: Yearly Cumulative percentage revision of Stability

Stability	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Minimal	1.03 (0.96, 1.11)	2.17 (2.06, 2.29)	2.80 (2.67, 2.94)	3.34 (3.18, 3.51)
Posterior Stabilised	1.14 (0.99, 1.32)	2.15 (1.91, 2.41)	2.96 (2.64, 3.31)	. (0.00, .)

Table KT19: Revision rates for Primary total knee replacements requiring revision by Patella Use

Patella Component	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Patella Not Used	1487	61927	2.4	139350	1.1	(1.01, 1.12)
Patella Used	766	45875	1.7	101795	0.8	(0.70, 0.81)
Total	**2253**	**107802**	**2.1**	**241145**	**0.9**	**(0.90, 0.97)**

Figure KT13: Cumulative percentage revision of Primary total knee replacements by Patella Use



Patella Usage	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Patella Not Used	61927	53799	45550	38544	31802	25857	19733	14535	9363	5427	2698
Patella Used	45875	40141	34315	28946	23643	18871	14205	10122	6148	3139	1290

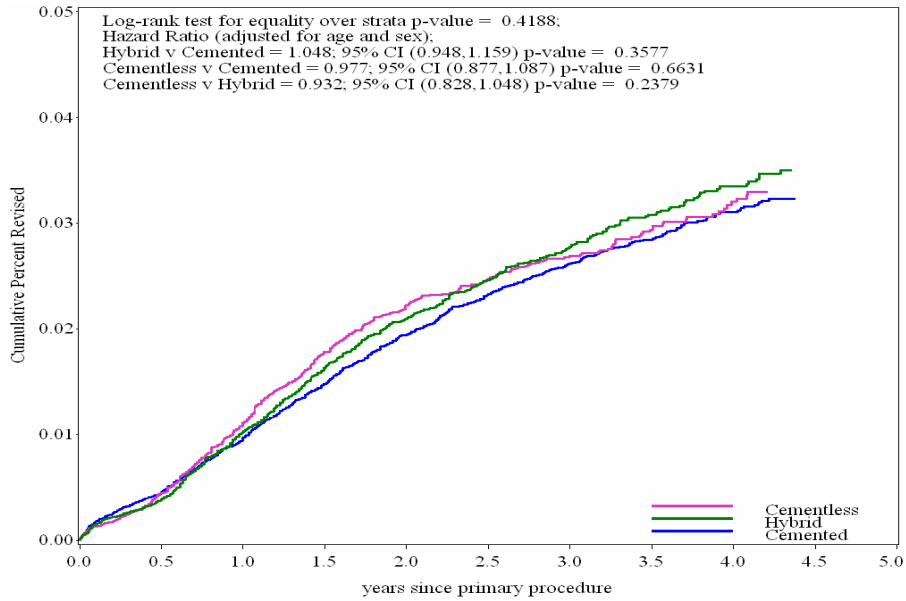
Table KT20: Yearly cumulative percentage revision of Patella Usage

Patella Usage	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Patella Not Used	1.14 (1.05, 1.23)	2.52 (2.38, 2.67)	3.26 (3.09, 3.45)	3.86 (3.65, 4.08)
Patella Used	0.90 (0.82, 1.00)	1.71 (1.58, 1.85)	2.26 (2.09, 2.44)	2.67 (2.47, 2.90)

Table KT21: Total Primary Knee Procedures requiring Revision by Cement Fixation excluding Cementless Genesis Oxinium and Profix Oxinium

Cement Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	1005	52499	1.9	117004	0.9	(0.81, 0.91)
Cementless	509	25451	2.0	55758	0.9	(0.84, 1.00)
Hybrid	619	29596	2.1	67852	0.9	(0.84, 0.99)
Total	**2133**	**107546**	**2.0**	**240615**	**0.9**	**(0.85, 0.92)**

Figure KT14: Cumulative percentage revision of Cement Fixation excluding Cementless Genesis Oxinium and Profix Oxinium



Cement Fixation	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Cemented	52499	45626	38593	32364	26550	21429	16539	12308	7924	4394	1999
Cementless	25451	22096	18815	15873	12962	10255	7572	5290	3191	1723	842
Hybrid	29596	25971	22241	19079	15783	12925	9792	7059	4396	2449	1147

Table KT22: Yearly cumulative percentage revision of Cement Fixation excluding Cementless Genesis Oxinium and Profix Oxinium

Cement Fixation	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Cemented	0.96 (0.88, 1.06)	1.94 (1.81, 2.08)	2.61 (2.44, 2.80)	3.11 (2.90, 3.33)
Cementless	1.11 (0.98, 1.26)	2.22 (2.02, 2.44)	2.68 (2.44, 2.93)	3.20 (2.90, 3.53)
Hybrid	1.02 (0.90, 1.15)	2.09 (1.91, 2.29)	2.78 (2.55, 3.02)	3.35 (3.07, 3.65)

Table KT23: Total Primary Knee Procedures requiring Revision with Cement Fixation

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
AGC	AGC	42	2057	2.0	5424	0.8	(0.56, 1.05)
Advance	Advance	19	443	4.3	1276	1.5	(0.90, 2.33)
Duracon	Duracon	117	5908	2.0	14113	0.8	(0.69, 0.99)
Genesis II	Genesis II	148	8129	1.8	17264	0.9	(0.72, 1.01)
Genesis II Oxin	Genesis II	20	1240	1.6	1212	1.7	(1.01, 2.55)
Kinemax Plus	Kinemax Plus	30	1470	2.0	4415	0.7	(0.46, 0.97)
LCS	LCS	132	3974	3.3	12197	1.1	(0.91, 1.28)
LCS	MBT	24	1490	1.6	2589	0.9	(0.59, 1.38)
Maxim	Maxim	13	463	2.8	1041	1.2	(0.66, 2.13)
Natural Knee	Natural Knee	13	860	1.5	2129	0.6	(0.33, 1.04)
Nexgen	Nexgen	35	4054	0.9	9227	0.4	(0.26, 0.53)
Nexgen LPS	Nexgen	65	3355	1.9	8798	0.7	(0.57, 0.94)
Nexgen LPS Flex	Nexgen	36	3698	1.0	4633	0.8	(0.54, 1.08)
Nexgen MBK	Nexgen MBK	11	296	3.7	1161	0.9	(0.47, 1.69)
PFC Sigma	PFC Sigma	69	5038	1.4	9994	0.7	(0.54, 0.87)
Profix	Profix	42	2551	1.6	5052	0.8	(0.60, 1.12)
Scorpio	Scorpio	30	1095	2.7	2174	1.4	(0.93, 1.97)
Scorpio	Series 7000	38	2195	1.7	5057	0.8	(0.53, 1.03)
Other (86)	-	121	4183	2.9	9248	1.3	(1.09, 1.56)
Total		**1005**	**52499**	**1.9**	**117004**	**0.9**	**(0.81, 0.91)**

Note: *Only prostheses with over 1000 observed component years have been listed*

Table KT24: Yearly cumulative percentage revision of Cement Fixation

Femoral Component	*Tibial Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
AGC	AGC	0.61 (0.34, 1.10)	1.71 (1.17, 2.49)	2.24 (1.59, 3.15)	3.39 (2.42, 4.74)
Advance	Advance	1.92 (0.96, 3.81)	4.71 (2.99, 7.40)	4.71 (2.99, 7.40)	5.32 (3.36, 8.37)
Duracon	Duracon	0.97 (0.74, 1.27)	1.79 (1.44, 2.22)	2.46 (2.01, 2.99)	3.17 (2.58, 3.89)
Genesis II	Genesis II	0.99 (0.78, 1.25)	1.88 (1.56, 2.26)	2.58 (2.17, 3.08)	2.84 (2.37, 3.39)
Genesis II Oxin	Genesis II	2.08 (1.24, 3.46)			
Kinemax Plus	Kinemax Plus	1.07 (0.65, 1.78)	1.74 (1.16, 2.61)	2.15 (1.47, 3.13)	2.44 (1.68, 3.54)
LCS	LCS	0.99 (0.72, 1.36)	2.69 (2.20, 3.29)	3.69 (3.09, 4.41)	4.20 (3.53, 4.99)
LCS	MBT	1.15 (0.67, 1.99)	2.23 (1.46, 3.39)	2.78 (1.78, 4.33)	
Maxim	Maxim	1.18 (0.49, 2.80)	2.66 (1.43, 4.92)	3.36 (1.78, 6.31)	
Natural Knee	Natural Knee	0.49 (0.18, 1.30)	1.39 (0.75, 2.59)	1.78 (1.01, 3.14)	2.27 (1.23, 4.17)
Nexgen	Nexgen	0.37 (0.22, 0.63)	0.80 (0.54, 1.19)	1.25 (0.87, 1.78)	1.40 (0.95, 2.05)
Nexgen LPS	Nexgen	0.99 (0.70, 1.40)	1.78 (1.35, 2.33)	2.24 (1.74, 2.89)	2.55 (1.98, 3.27)
Nexgen LPS Flex	Nexgen	0.78 (0.51, 1.19)	1.67 (1.16, 2.41)		
Nexgen MBK	Nexgen MBK	0.84 (0.61, 1.16)	1.48 (1.14, 1.94)	1.99 (1.52, 2.59)	2.21 (1.67, 2.91)
PFC Sigma	PFC Sigma	1.27 (0.88, 1.84)	1.78 (1.28, 2.48)	2.38 (1.71, 3.31)	
Profix	Profix	1.02 (0.55, 1.90)	2.71 (1.77, 4.12)	3.99 (2.66, 5.97)	
Scorpio	Scorpio	0.88 (0.55, 1.42)	1.77 (1.23, 2.53)	2.37 (1.69, 3.32)	2.72 (1.93, 3.84)
Scorpio	Series 7000	1.39 (1.06, 1.82)	2.79 (2.27, 3.43)	3.97 (3.30, 4.78)	4.80 (3.99, 5.76)
Other (86)	-	0.61 (0.34, 1.10)	1.71 (1.17, 2.49)	2.24 (1.59, 3.15)	3.39 (2.42, 4.74)

Table KT25: Total Primary Knee Procedures requiring Revision with Cementless Fixation

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Active Knee	Active Knee	37	1824	2.0	3072	1.2	(0.85, 1.66)
Advantim	Advantim	5	420	1.2	1235	0.4	(0.13, 0.94)
Duracon	Duracon	48	2173	2.2	5286	0.9	(0.67, 1.20)
Genesis II	Mobile Bearing	10	425	2.4	1338	0.7	(0.36, 1.37)
LCS	LCS	69	2259	3.1	7726	0.9	(0.69, 1.13)
LCS	MBT	88	5421	1.6	9221	1.0	(0.77, 1.18)
Maxim	Maxim	18	566	3.2	1583	1.1	(0.67, 1.80)
Natural Knee	Natural Knee	34	1650	2.1	4063	0.8	(0.58, 1.17)
Nexgen	Nexgen	46	3965	1.2	8534	0.5	(0.39, 0.72)
PFC Sigma	Coordinate	11	644	1.7	1293	0.9	(0.42, 1.52)
PFC Sigma	MBT	14	636	2.2	1069	1.3	(0.72, 2.20)
Profix	Profix	12	622	1.9	1411	0.9	(0.44, 1.49)
RBK	RBK	21	1219	1.7	2201	1.0	(0.59, 1.46)
Scorpio	Scorpio	25	1033	2.4	2716	0.9	(0.60, 1.36)
Scorpio	Series 7000	20	1182	1.7	1741	1.1	(0.70, 1.77)
Other (39)	-	171	1668	10.3	3800	4.5	(3.85, 5.23)
Total		**629**	**25707**	**2.4**	**56289**	**1.1**	**(1.03, 1.21)**

Note: *Only prostheses with over 1000 observed component years have been listed*

Table KT26: Yearly cumulative percentage revision of Cementless Fixation

Femoral Component	*Tibial Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
Active Knee	Active Knee	1.27 (0.82, 1.97)	2.66 (1.90, 3.72)	2.66 (1.90, 3.72)	
Advantim	Advantim	0.29 (0.04, 2.07)	1.26 (0.47, 3.32)	1.64 (0.68, 3.90)	1.64 (0.68, 3.90)
Duracon	Duracon	1.04 (0.67, 1.61)	2.05 (1.48, 2.84)	2.70 (1.99, 3.66)	3.55 (2.60, 4.83)
Genesis II	Mobile Bearing	1.48 (0.67, 3.27)	1.48 (0.67, 3.27)	2.17 (1.08, 4.34)	2.98 (1.59, 5.55)
LCS	LCS	1.37 (0.96, 1.95)	2.51 (1.93, 3.28)	2.94 (2.28, 3.77)	3.45 (2.70, 4.40)
LCS	MBT	0.94 (0.69, 1.27)	2.25 (1.80, 2.81)	2.58 (2.06, 3.22)	
Maxim	Maxim	1.85 (1.00, 3.41)	2.97 (1.80, 4.90)	3.72 (2.35, 5.87)	3.72 (2.35, 5.87)
Natural Knee	Natural Knee	0.98 (0.59, 1.61)	2.06 (1.42, 2.98)	2.46 (1.71, 3.53)	3.35 (2.20, 5.09)
Nexgen	Nexgen	0.64 (0.42, 0.99)	1.25 (0.90, 1.74)	1.74 (1.28, 2.36)	2.03 (1.45, 2.84)
PFC Sigma	Coordinate	0.57 (0.19, 1.77)	1.80 (0.89, 3.59)	2.23 (1.13, 4.36)	
PFC Sigma	MBT	1.22 (0.54, 2.72)	3.46 (1.97, 6.02)	4.04 (2.32, 6.98)	
Profix	Profix	1.13 (0.51, 2.52)	2.68 (1.51, 4.72)	2.68 (1.51, 4.72)	2.68 (1.51, 4.72)
RBK	RBK	0.80 (0.40, 1.59)	2.10 (1.32, 3.34)	2.70 (1.74, 4.17)	
Scorpio	Scorpio	1.88 (1.19, 2.97)	2.59 (1.74, 3.85)	2.59 (1.74, 3.85)	2.97 (1.94, 4.53)
Scorpio	Series 7000	1.27 (0.70, 2.29)	2.43 (1.48, 3.98)	3.30 (1.97, 5.50)	
Other (39)	-	4.41 (3.45, 5.63)	10.8 (9.21, 12.62)	13.5 (11.67, 15.60)	14.4 (12.42, 16.71)

Table KT27: Total Primary Knee Procedures requiring Revision with Hybrid Fixation

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
AGC	AGC	12	930	1.3	2698	0.4	(0.23, 0.78)
Duracon	Duracon	125	5642	2.2	14170	0.9	(0.73, 1.05)
Genesis II	Genesis II	42	2093	2.0	4534	0.9	(0.67, 1.25)
LCS	LCS	51	2128	2.4	5942	0.9	(0.64, 1.13)
LCS	MBT	19	1218	1.6	1990	1.0	(0.57, 1.49)
Maxim	Maxim	17	895	1.9	1665	1.0	(0.59, 1.64)
Natural Knee	Natural Knee	19	1059	1.8	2661	0.7	(0.43, 1.11)
Nexgen	Nexgen	44	3326	1.3	6802	0.6	(0.47, 0.87)
PFC Sigma	PFC Sigma	78	3428	2.3	7653	1.0	(0.81, 1.27)
Profix	Mobile Bearing	11	549	2.0	1022	1.1	(0.54, 1.93)
Profix	Profix	10	523	1.9	1175	0.9	(0.41, 1.56)
Scorpio	Scorpio	24	1324	1.8	2838	0.8	(0.54, 1.26)
Scorpio	Series 7000	48	3031	1.6	7053	0.7	(0.50, 0.90)
Other (73)	-	119	3450	3.4	7649	1.6	(1.29, 1.86)
Total		**619**	**29596**	**2.1**	**67852**	**0.9**	**(0.84, 0.99)**

Note: *Only prostheses with over 1000 observed component years have been listed*

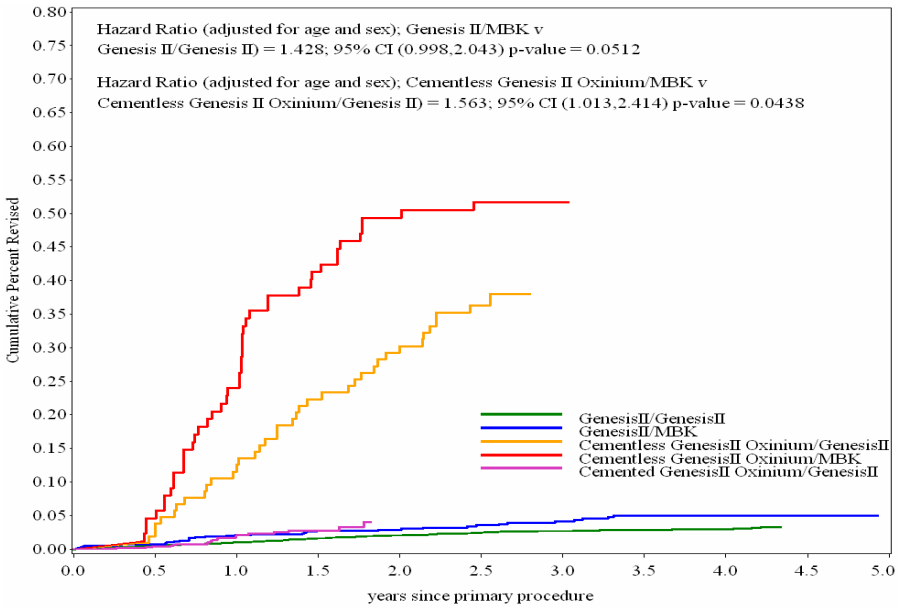
Table KT28: Yearly cumulative percentage revision of Hybrid Fixation

Femoral Component	*Tibial Component*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
AGC	AGC	0.69 (0.31, 1.54)	1.24 (0.67, 2.30)	1.24 (0.67, 2.30)	1.59 (0.83, 3.01)
Duracon	Duracon	1.16 (0.90, 1.50)	2.06 (1.69, 2.52)	2.69 (2.24, 3.24)	3.23 (2.67, 3.90)
Genesis II	Genesis II	1.07 (0.68, 1.67)	2.52 (1.83, 3.47)	2.85 (2.09, 3.88)	3.08 (2.23, 4.25)
LCS	LCS	0.99 (0.64, 1.54)	1.82 (1.30, 2.55)	2.43 (1.79, 3.29)	3.17 (2.35, 4.27)
LCS	MBT	0.72 (0.34, 1.52)	2.26 (1.36, 3.73)	2.83 (1.73, 4.59)	
Maxim	Maxim	0.74 (0.33, 1.64)	2.57 (1.56, 4.22)	3.27 (1.85, 5.77)	
Natural Knee	Natural Knee	0.71 (0.34, 1.49)	1.87 (1.14, 3.04)	2.03 (1.26, 3.26)	2.68 (1.62, 4.41)
Nexgen	Nexgen	0.51 (0.30, 0.86)	1.46 (1.03, 2.07)	1.96 (1.41, 2.72)	2.56 (1.82, 3.61)
PFC Sigma	PFC Sigma	1.27 (0.92, 1.75)	2.52 (1.97, 3.21)	2.87 (2.26, 3.64)	3.93 (3.04, 5.08)
Profix	Mobile Bearing	1.26 (0.56, 2.78)	2.17 (1.12, 4.18)	2.99 (1.45, 6.09)	
Profix	Profix	1.09 (0.45, 2.59)	1.59 (0.76, 3.32)	2.99 (1.55, 5.71)	2.99 (1.55, 5.71)
Scorpio	Scorpio	0.77 (0.40, 1.48)	1.34 (0.79, 2.28)	2.68 (1.69, 4.21)	
Scorpio	Series 7000	0.81 (0.54, 1.24)	1.43 (1.02, 2.02)	1.91 (1.40, 2.62)	2.33 (1.71, 3.18)
Other (73)	-	1.61 (1.20, 2.15)	3.43 (2.78, 4.24)	5.29 (4.39, 6.38)	5.59 (4.64, 6.74)

Table KT29: Revision rates for Genesis II Femoral component by Tibial component

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Genesis II	Genesis II	194	10284	1.9	21975	0.9	(0.76, 1.02)
Genesis II	MBK	36	985	3.7	2795	1.3	(0.90, 1.78)
C/less Genesis II Ox	Genesis II	39	105	37.1	221	17.6	(12.53, 24.10)
C/less Genesis II Ox	MBK	45	88	51.1	167	27.0	(19.71, 36.16)
C/ed Genesis II Ox	Genesis II	20	1242	1.6	1215	1.6	(1.01, 2.54)
Total		**334**	**12704**	**2.6**	**26373**	**1.3**	**(1.13, 1.41)**

Figure KT15: Cumulative percentage revision of Genesis II Total knee Prosthesis



Femoral	*Tibial*	*Number at risk at start of the period*										
		0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Genesis II	Genesis II	10284	8805	7336	6048	4869	3857	2997	2277	1502	832	334
Genesis 11	MBK	985	910	819	735	638	537	493	398	293	184	94
C/less Genesis II Ox	Genesis II	105	101	91	79	70	53	2				
C/less Genesis II Ox	MBK	88	84	66	51	44	38	9				
C/ed Genesis II Ox	Genesis II	1242	896	529	266	88	41	14				

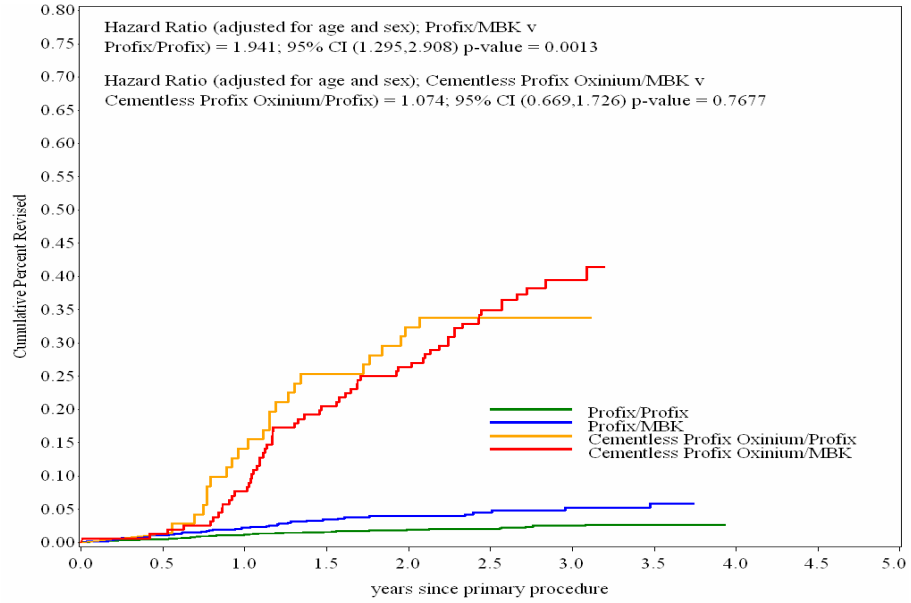
Table KT30: Yearly cumulative percentage revision of Genesis II Femoral component by Tibial component

Femoral	*Tibial*	*Cumulative Percent Revised (95% CI)*			
		1 year	*2 years*	*3 years*	*4 years*
Genesis II	Genesis II	1.00 (0.81, 1.23)	2.05 (1.74, 2.40)	2.69 (2.32, 3.13)	2.94 (2.52, 3.43)
Genesis 11	MBK	2.09 (1.34, 3.26)	2.88 (1.95, 4.24)	4.11 (2.90, 5.82)	4.94 (3.54, 6.86)
C/less Genesis II Ox	Genesis II	11.5 (6.72, 19.43)	30.2 (22.31, 40.11)		
C/less Genesis II Ox	MBK	24.0 (16.34, 34.36)	49.3 (39.40, 60.22)	51.7 (41.68, 62.50)	
C/ed Genesis II Ox	Genesis II	2.07 (1.24, 3.46)			

Table KT31: Revision rates for Profix Femoral component by Tibial component

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Profix	Profix	64	3696	1.7	7638	0.8	(0.65, 1.07)
Profix	MBK	38	1083	3.5	2050	1.9	(1.31, 2.54)
C/less Profix Ox	Profix	24	71	33.8	158	15.2	(9.73, 22.60)
C/less Profix Ox	MBK	60	158	38.0	368	16.3	(12.46, 21.01)
C/ed Profix Ox	Profix	0	21	0.0	29	0.0	(0.00, 12.89)
Total		**186**	**5029**	**3.7**	**10243**	**1.8**	**(1.56, 2.10)**

Figure KT16: Cumulative percentage revision of Profix Total Knee Prosthesis



Femoral	*Tibial*	*Number at risk at start of the period*										
		0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Profix	Profix	3696	3185	2664	2235	1789	1350	973	655	359	195	102
Profix	MBK	1083	961	792	613	432	306	243	168	49	6	
C/less Profix Ox	Profix	71	71	61	53	48	40	7				
C/less Profix Ox	MBK	158	155	144	123	113	88	38				
C/ed Profix Ox	Profix	21	18	17	8	4	2					

Table KT32: Yearly cumulative percentage revision of Profix Femoral component by Tibial component

Femoral	*Tibial*	*Cumulative Percent Revised (95% CI)*		
		1 year	*2 years*	*3 years*
Profix	Profix	1.22 (0.89, 1.67)	2.08 (1.61, 2.69)	2.68 (2.08, 3.45)
Profix	MBK	2.15 (1.40, 3.28)	4.37 (3.17, 6.02)	6.13 (4.44, 8.44)
C/less Profix Ox	Profix	16.9 (9.50, 29.21)	32.2 (21.90, 45.72)	
C/less Profix Ox	MBK	8.92 (5.17, 15.18)	27.7 (20.88, 36.07)	41.3 (33.15, 50.58)
C/ed Profix Ox	Profix	(0.00, .)	. (0.00, .)	

Revision Knee Replacement

This report is based on the analysis of 11,890 revision knee operations recorded by the registry with a procedure date prior to the end of 2005.

As with revision hip procedures there are two groups of revision knee procedures. There are those where the primary procedure is known and therefore the Registry has a full chronological list of procedures that have occurred subsequent to the primary. Currently this is 3745 revision procedures or 31.5% of all revisions. These procedures however include all revisions of a known primary knee and for some of these there have been multiple revisions. The number of known primary procedures that have been revised at least once is 3138.

The remainder of the revisions are revision procedures where the primary procedure was undertaken prior to the establishment of the Registry. The Registry may have information on a previous revision procedure(s) for some of theses. Unlike the first group of revisions however the Registry does not have a full chronological list of all procedures commencing with the original primary procedure.

The difficulties this presents in the analysis of knee revision procedures has been previously explained in the revision hip section. As with the hips however there is useful information to be gained by analysing these procedures.

Use of different Types of Revisions

All revisions.

The majority of all revision procedures recorded by the Registry are major revisions (8017 or 67.4%). The definitions of major and minor revisions have previously been explained in the General Introduction to knee replacement procedures. Major revisions are where either or both the femoral or tibial components are revised. There are two different types of major revision, major partial and major total. Major partial revisions account for 22.1% of all major revisions (34.1% femoral only and 65.9% tibial only) (TableKR1).

When primary knee procedures other than total primary knees are revised i.e.: all types of partial knee replacement (unicompartment, patellar trochlear etc) they may be revised to a total knee or undergo revisions using partial knee replacement components. When revised to a total knee they are included in the tibial and femoral revision group. The small number of partial knee components used in revision procedures indicates that when primary partial knee replacements are revised they are most often converted to a total knee replacement (Table KR1).

There are a small number of major revisions where the original prosthesis is reinserted (0.1%), where components are completely removed (1.0%) and where a cement spacer was used (5.0%) (Table KR1).

The Registry has information on 3873 minor revisions (32.6%). Minor revisions occur much more frequently following primary knee replacement compared to primary hip replacement. The majority of minor revisions are insert only exchanges (39.7%). Of the remainder 28.6% are patella resurfacing procedures and patella resurfacing plus insert exchange in 26.2% (Table KR2).

During the last five years there has been little change in the proportion of the different types of revision procedures performed. There are however some state and territory variation in these proportions with Western Australia, South Australia and Tasmania having the highest proportion of minor revisions (38%, 38.8% and 43.8% respectively) (Figure KR1)

Revisions of known Primary Knees

Analysis of the different types of revisions when the primary procedure is known has been confined to the first revision of the known primary. The Registry has

determined the different types of revisions for all different categories of primary procedures combined. This is a similar analysis to the analysis presented for the all revision procedures group.

When considering revisions of all known primary knee procedures as one group there are differences in the proportions of the different types of revision compared to the analysis for all revisions procedures group. This difference is almost certainly due to the timing of the revision procedure. When the Registry has information on the original primary procedure then any subsequent revisions recorded by the registry is an early revision.

The most common type of revision when the primary is known is major total tibial and femoral revision (59.1%) (Table KR3). This occurs less frequently compared to the proportion of major total revisions in the all revision procedures group. Other differences when comparing revisions of known primary procedures to the all revision group are a higher rate of femoral only revision and a slightly higher increased use of partial knee revision components (Table KR3). The proportion of minor revisions is 34.7%. The most common types of minor revision are patella only (41.1%) and insert only revisions (41.0%) (Table KR4).

Diagnosis

A potential major factor contributing to any differences in the reasons for revisions for the known primary group compared to the all revision group is that the revisions for the known primary group are early revisions. Despite this the diagnoses are similar for the two groups.

As would be anticipated there are less revisions for tibial component wear and lysis in the known primary group. Revisions for loosening occur at a similar rate and there is a higher proportion of revisions undertaken for pain in the known primary group (Table RK5).

Age and Gender

In 2005 the proportion of males and females having revision knee procedures was the same. There has been a slight increase in the proportion of females undergoing knee revisions in recent years (Table KR6).

There has been little change in the age of patients undergoing revision surgery with the major age group having revision procedures being between 65 and 74 years of age (33.9% in 2005) (Table KR7). This is a younger group compared to revision hip procedures.

Outcomes

A variety of analyses have been done related to the outcomes of revision knee procedures. As with hip revision meaningful interpretation is difficult without a full chronological history. Therefore analysis for this report is confined to the outcomes of revision procedures where the primary procedure is known.

The outcomes for revision of known primary total knee and known primary unicompartmental knee are considered separately. In addition the analysis is limited to determining the outcomes of the first revision of those primary procedures. As with the hip revisions, the Registry has excluded those revisions where infection was the diagnosis for the initial revision.

Outcomes by Type of revision

When the primary procedure was a total knee there are differences in outcome dependant on the type of revision that was undertaken. Minor revisions and major partial revisions are subsequently revised more frequently than major total revisions (Table KR8).

The least revised revision of unicompartmental knees is a conversion to a total knee. When a unicompartment to unicompartment revision is undertaken the least revised is when both the tibial and femoral unicompartment prostheses are replaced (Table KR9).

The Registry has highlighted the much higher revision rate of primary unicompartmental knee replacement

compared to primary total knee replacement. A justification that is sometimes used for the use of primary unicompartmental knee replacement is the ease of conversion to a total knee.

The Registry has undertaken a more detailed analysis of the results of this type of revision and compared those results to undertaking a primary total knee on the first occasion. The cumulative percentage revision rate of a total knee conversion of a primary unicompartment knee at three years is 11.4% (Table KR10, Table KR11 and Figure KR3).

Outcomes by age and gender
As the number of procedures is small the analysis by age has been limited to below 65 years and 65 years and above. Also the outcomes of known primary unicompartment and total knee replacements have been combined. Major total and major partial revisions are revised more frequently in the under 65 year age group. Minor revisions are revised more frequently in the older age group (Tables KR12-14).

The only apparent gender difference is that males having major partial revisions have a much higher rate of re-revision compared to females (Tables KR15-17).

Outcomes by Fixation
This is only relevant to major revisions both major total and major partial revisions. When considering a major total revision the fixation of the tibial and femoral components may be both cemented, both cementless or hybrid fixation. Hybrid fixation may be a cemented tibial component and cementless femoral component or the reverse or cementless tibial and cemented femoral component. As the latter form of hybrid fixation is rarely used these two types of hybrid fixation have been combined in the analysis.

Both components are cemented in the majority of major total revisions. This method of fixation is revised less often than the other two approaches. Hybrid fixation is revised more often than cementless fixation (Table KR18).

Major partial revisions can only be cemented or cementless. Again cemented fixation is used more frequently and this method of fixation is revised less often (Table KR19).

Table KR1: All Revisions - Major Revision Knee Replacement

Components Used	*Cemented*		*Cementless*		*Tibial cemented Femoral cementless*		*Tibial cementless Femoral cemented*		*N/A*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Tibial and Femoral	4562	56.9	396	4.9	519	6.5	176	2.2	.	.	5653	70.5
Tibial Only*	1030	12.8	43	0.5	.	.	.	.	.	.	1073	13.4
Femoral Only*	512	6.4	45	0.6	.	.	.	.	.	.	557	6.9
Uni Tibial and Femoral	48	0.6	4	0.0	2	0.0	3	0.0	.	.	57	0.7
Uni Tibial Only*	91	1.1	5	0.1	.	.	1	0.0	.	.	97	1.2
Uni Femoral Only*	46	0.6	2	0.0	.	.	.	.	.	.	48	0.6
Cement Spacer	.	.	.	.	.	.	.	.	403	5.0	403	5.0
Removal of Prostheses	.	.	.	.	.	.	.	.	82	1.0	82	1.0
Fusion Nail	.	.	.	.	.	.	.	.	30	0.4	30	0.4
Reinsertion of Components†	4	0.0	1	0.0	1	0.0	2	0.0	.	.	8	0.1
Patella/Trochlear Resurfacing	.	.	9	0.1	.	.	.	.	.	.	9	0.1
Total	**6293**	**78.5**	**505**	**6.3**	**522**	**6.5**	**182**	**2.3**	**515**	**6.4**	**8017**	**100.0**

Note: *N/A means not applicable because a knee component was not used.*
*†prostheses removed cleaned and reinserted, * Major partial revisions.*

Table KR2: All Revisions - Minor Revision Knee Replacement

Components Used	*Number*	*%*
Insert and Patella	1013	26.2
Patella Only	1107	28.6
Insert Only	1539	39.7
Uni Insert Only	121	3.1
Cable/ Other minor components	85	2.2
Removal of patella	8	0.2
Total	**3873**	**100.0**

Figure KR1: Trends in Usage for Revision Knee Replacement by State and Territory

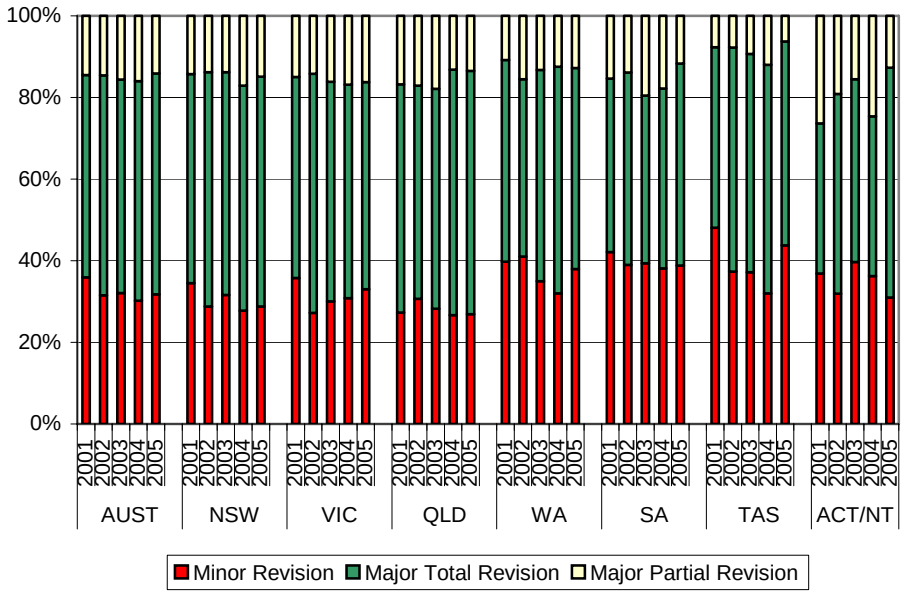


Table KR3: Revisions of known primary procedures - Major Revision Knee Replacement

Components Used	*Cemented*		*Cementless*		*Tibial cemented Femoral cementless*		*Tibial cementless Femoral cemented*		*N/A*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Tibial and Femoral	844	41.3	138	6.7	194	9.5	33	1.6	.	.	1209	59.1
Tibial Only*	255	12.5	13	0.6	.	.	.	.	.	.	268	13.1
Femoral Only*	266	13.0	16	0.8	.	.	.	.	.	.	282	13.8
Uni Tibial and Femoral	26	1.3	3	0.1	2	0.1	1	0.0	.	.	32	1.6
Uni Tibial Only*	67	3.3	2	0.1	.	.	1	0.0	.	.	70	3.4
Uni Femoral Only*	32	1.6	1	0.0	.	.	.	.	.	.	33	1.6
Cement Spacer	.	.	.	.	.	.	.	.	117	5.7	117	5.7
Removal of Prostheses	.	.	.	.	.	.	.	.	25	1.2	25	1.2
Fusion Nail	.	.	.	.	.	.	.	.	2	0.1	2	0.1
Reinsertion of Components†	3	0.1	1	0.0	1	0.0	1	0.0	.	.	6	0.3
Patella/Trochlear Resurfacing	.	.	2	0.1	.	.	.	.	.	.	2	0.1
Total	**1493**	**73.0**	**176**	**8.6**	**197**	**9.6**	**36**	**1.8**	**144**	**7.0**	**2046**	**100.0**

Note: *N/A means not applicable because a knee component was not used.*
*†prostheses removed cleaned and reinserted, * Major partial revisions.*

Table KR4: Revisions of known primary procedures - Minor Revision Knee Replacement

Components Used	*Number*	*%*
Insert and Patella	176	16.1
Patella Only	449	41.1
Insert Only	448	41.0
Cable/ Other minor components	19	1.7
Total	**1092**	**100.0**

Table KR5: Diagnosis - Revision Knee Replacement

Diagnosis	*All Revisions*		*Revisions with known primary*	
	Number	*%*	*Number*	*%*
Loosening	5145	37.8	1282	37.3
Infection	1923	14.1	562	16.4
Wear Tibial	1116	8.2	44	1.3
Lysis	982	7.2	58	1.7
Pain	934	6.9	408	11.9
Patello Femoral Pain	664	4.9	134	3.9
Implant Breakage Tibial	468	3.4	30	0.9
Instability	368	2.7	123	3.6
Progression of Disease	319	2.3	134	3.9
Fracture	298	2.2	108	3.2
Implant Breakage Patella	201	1.5	18	0.5
Arthrofibrosis	188	1.4	96	2.8
Wear Patella	163	1.2	18	0.5
Malalignment	125	0.9	64	1.9
Implant Breakage Femoral	100	0.7	15	0.4
Synovitis	89	0.7	28	0.8
Dislocation	79	0.6	36	1.1
Bearing/Dislocation	71	0.5	33	1.0
Patella Maltracking	68	0.5	21	0.6
Incorrect Sizing	65	0.5	39	1.1
Avascular Necrosis	18	0.1	13	0.4
Heterotropic Bone	10	0.1	2	0.1
Arthrodesis Takedown	3	0.0	2	0.1
Other	222	1.6	41	1.2
Total	**13619**	**100.0**	**3309**	**100.0**

Note: *some patients had multiple diagnoses*

Table KR6: Usage for Revision Knee Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2001	722	47.1	812	52.9	1534	100.0
2002	983	46.3	1139	53.7	2122	100.0
2003	1113	48.4	1187	51.6	2300	100.0
2004	1263	48.1	1364	51.9	2627	100.0
2005	1329	50.0	1329	50.0	2658	100.0

Table KR7: Usage for Revision Knee Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2001	111	7.2	276	18.0	522	34.0	550	35.9	75	4.9	1534	100.0
2002	167	7.9	425	20.0	703	33.1	712	33.6	115	5.4	2122	100.0
2003	214	9.3	447	19.4	747	32.5	788	34.3	104	4.5	2300	100.0
2004	270	10.3	585	22.3	882	33.6	784	29.8	106	4.0	2627	100.0
2005	224	8.4	565	21.3	902	33.9	852	32.1	115	4.3	2658	100.0

Table KR8: Outcomes of minor, major partial, and major total revisions of known primary total knees (excluding infection as a cause of revision)

Type of revision knee replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Minor	86	888	9.7	1413	6.1	(4.87, 7.52)
Major Partial	44	520	8.5	804	5.5	(3.98, 7.35)
Major Total	24	321	7.5	522	4.6	(2.94, 6.83)
Total	**154**	**1729**	**8.9**	**2739**	**5.6**	**(4.77, 6.58)**

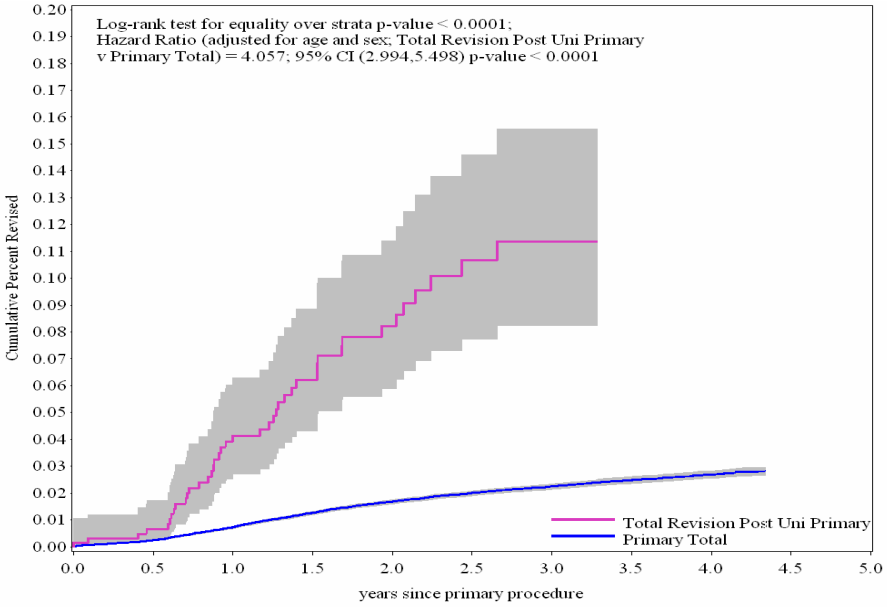
Table KR9: Outcomes of minor, major partial uni, major total uni revisions and total knee revisions of known primary unicompartmental knees (excluding infection as a cause of revision)

Type of revision knee replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Minor	12	61	19.7	115	10.5	(5.41, 18.30)
Major Partial Uni	14	100	14.0	163	8.6	(4.68, 14.37)
Major Total Uni	1	13	7.7	24	4.2	(0.11, 23.53)
To Total Knee	43	672	6.4	1076	4.0	(2.89, 5.38)
Total	**70**	**846**	**8.3**	**1378**	**5.1**	**(3.96, 6.42)**

Table KR10: Outcome of total knee revision of primary unicompartment knee replacement compared to outcome of total primary knee.

Procedure	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Uni to Total Knee	43	672	6.4	1076	4.0	(2.89, 5.38)
Primary Total	1748	107297	1.6	240654	0.7	(0.69, 0.76)
Total	**1791**	**107969**	**1.7**	**241730**	**0.7**	**(0.71, 0.78)**

Figure KR3: Outcome of total knee revision of primary unicompartment knee replacement compared to outcome of total primary knee.



Procedure	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Uni to Total	672	553	431	311	218	148	92	49	21	5	1
Primary Total	107297	93631	79671	67371	55373	44685	33914	24643	15509	8565	3988

Table KR11: Yearly cumulative percentage revision of total knee revision of primary unicompartment knee replacement compared to outcome of total primary knee.

Procedure	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
Uni to Total	4.14 (2.71, 6.30)	8.22 (5.90, 11.38)	11.4 (8.23, 15.57)
Primary Total	0.74 (0.68, 0.79)	1.69 (1.60, 1.78)	2.25 (2.14, 2.37)

Table KR12: Outcome of major total revisions of known primary total and unicompartmental knee by Age (excluding infection as a cause of revision)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<65	44	532	8.3	827	5.3	(3.87, 7.14)
>=65	23	461	5.0	772	3.0	(1.89, 4.47)
Total	**67**	**993**	**6.7**	**1599**	**4.2**	**(3.25, 5.32)**

Table KR13: Outcome of major partial revisions of known primary total and unicompartmental knee by Age (excluding infection as a cause of revision)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<65	15	123	12.2	176	8.5	(4.76, 14.03)
>=65	4	134	3.0	233	1.7	(0.47, 4.40)
Total	**19**	**257**	**7.4**	**409**	**4.6**	**(2.80, 7.25)**

Table KR14: Outcome of minor revisions of known primary total and unicompartmental knee by Age (excluding infection as a cause of revision)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<65	11	127	8.7	194	5.7	(2.83, 10.16)
>=65	14	137	10.2	203	6.9	(3.78, 11.60)
Total	**25**	**264**	**9.5**	**396**	**6.3**	**(4.08, 9.31)**

Table KR15: Outcome of major total revisions of known primary total and unicompartmental knee by Sex (excluding infection as a cause of revision)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	40	555	7.2	908	4.4	(3.15, 6.00)
Male	27	438	6.2	690	3.9	(2.58, 5.69)
Total	**67**	**993**	**6.7**	**1599**	**4.2**	**(3.25, 5.32)**

Table KR16: Outcome of major partial revisions of known primary total and unicompartmental knee by Sex (excluding infection as a cause of revision)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	9	167	5.4	260	3.5	(1.58, 6.57)
Male	10	90	11.1	149	6.7	(3.22, 12.33)
Total	**19**	**257**	**7.4**	**409**	**4.6**	**(2.80, 7.25)**

Table KR17: Outcome of minor revisions of known primary total and unicompartmental knee by Sex (excluding infection as a cause of revision)

Sex	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Female	13	134	9.7	204	6.4	(3.39, 10.90)
Male	12	130	9.2	192	6.2	(3.23, 10.90)
Total	**25**	**264**	**9.5**	**396**	**6.3**	**(4.08, 9.31)**

Outcomes related to fixation and type of Primary procedure

Table KR18: Outcomes of major total revisions of known primary total and unicompartmental knee by fixation (excluding infection as a cause of revision)

Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cementless	8	121	6.6	189	4.2	(1.83, 8.36)
Cemented	41	670	6.1	1071	3.8	(2.75, 5.19)
Hybrid	18	202	8.9	339	5.3	(3.14, 8.38)
Total	**67**	**993**	**6.7**	**1599**	**4.2**	**(3.25, 5.32)**

Table KR19: Outcomes of major partial revisions of known primary total and unicompartmental knee by fixation (excluding infection as a cause of revision)

Fixation	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cementless	5	27	18.5	51	9.9	(0.09, 19.58)
Cemented	39	494	7.9	755	5.2	(2.80, 7.47)
Total	**19**	**521**	**8.4**	**805**	**6.3**	**(2.80, 7.25)**

AOA National Joint Replacement Registry
Cement Data

Introduction

This section details the use of cement in primary and revision hip and knee replacement reported to the Registry for the period to the end of December 2005.

Usage

The most evident change in cement use is the increased use of antibiotic cement. This has occurred both with primary hip and knee replacement. It is evident across all states and territories (Figures C1 and C2).

There has also been an increase in the number of different types of cement used. There were 30 reported in 2004 and in 2005 this has increased to 38.

The different cement types used in primary hip replacement with femoral and acetabular prostheses are detailed in Table C1 and for cemented hip revisions in Table C2. When cement is used in primary hip replacement antibiotic cement is used in 80.7% of femoral and 60.6% of acetabular prostheses (Table C1). Antibiotic cement is used a little more frequently in cemented hip revisions, 82.2% of acetabular and 79.9% of femoral revisions (Table C2).

The different cement types used in primary knee replacement are shown in Table C3 and revision knees in Table C4. As with hip replacement antibiotic cement is used more frequently than non-antibiotic cement (cemented femoral 78.2%, cemented tibial 72.9%, and cemented patellar prostheses 64.7%) (Table C4). Antibiotic cement is used in 77.1% of cemented femoral revisions, 81.8% of cemented tibial revisions, and 69% of resurfacings of the patella in revision procedures (Table C4).

Outcomes

The Registry has compared the outcomes of antibiotic and non-antibiotic cement for both primary hip and primary knee replacement.

When cement is used in primary total hip it can be used with one or both prostheses. If it is used with one (ie. a hybrid replacement) then the cement can be either antibiotic or non-antibiotic. If it is used with both prostheses, then both may be used with either antibiotic or non-antibiotic or alternatively one may be used with antibiotic and the other with non-antibiotic cement. A similar situation occurs with primary knee replacement with the added complexity of the addition of a third prosthesis, the patellar component, and the variable use of antibiotic and non-antibiotic cement with that prosthesis.

Primary total hip Replacement

The Registry has compared revision rates for the various combinations of antibiotic and non-antibiotic cement and found no statistical difference in the rate of revision (Table C5).

The Registry has also compared cemented procedures where antibiotic cement was used for at least one of the prosthesis to procedures where only non-antibiotic cement was used. Again there is no statistical difference in the rates of revision (Table C6, Table C7 and Figure C3).

Analysis of the reason for revision however indicates that when antibiotic cement is used there is a reduction in the number of procedures revised for infection (0.5% down to 0.3% of all procedures) and loosening (0.8% to 0.6%). Other reasons for revision however are increased with the use of antibiotic cement. In particular there is an increase in revision for dislocation (0.5% to 0.8% of all procedures) (Table C8).

It remains uncertain as too why antibiotic cement may be associated with increased rates of dislocation. It is possible that this may be due to factors other than the use of the antibiotic cement. The Registry was unable to resolve this issue prior to the publication of this report. At this point in

time however the Registry has not been able to establish that the use of antibiotic cement reduces the risk of revision in primary total hip replacement.

Primary Total knee replacement

Unlike hip replacement there is a statistically significantly reduction in the risk of revision if antibiotic cement is used in primary total knee replacement (hazard ratio (adjusted for age and sex) non v antibiotic cement = 1.198; 95% CI (1.050,1.366) p=0.0071) (Tables C9 and C10 and C11and Figure C4).

This reduced revision rate is the result of reduction in revisions occurring for a number of different diagnoses. These include infection down from 0.7% to 0.5% of all procedures, loosening down from 0.8% to 0.5% and "other" 0.9% to 0.5% (Table C12).

Figure C1: Trends in Usage of antibiotic cement in Total Hips by State and Territory

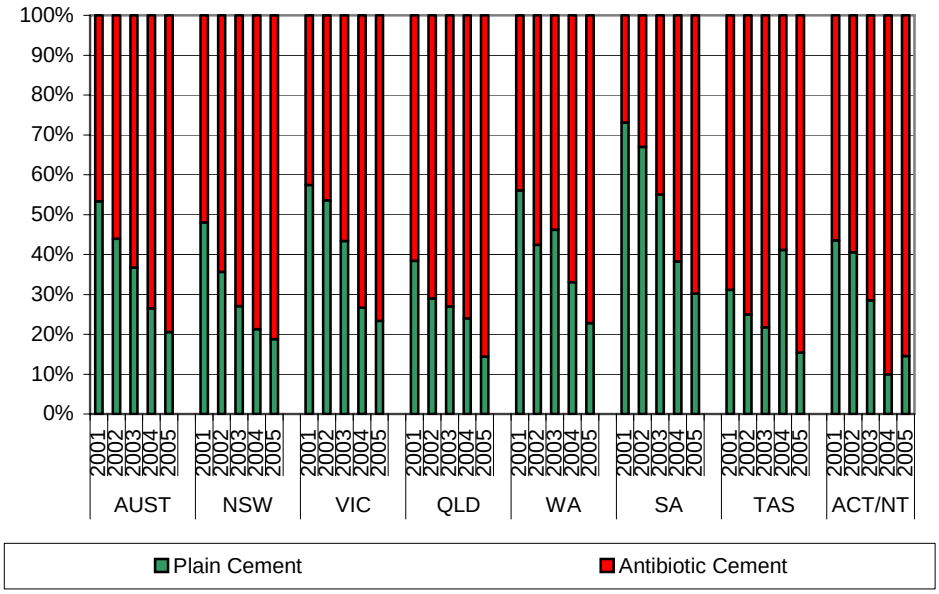


Figure C2: Trends in Usage of antibiotic cement in Total Knees by State and Territory

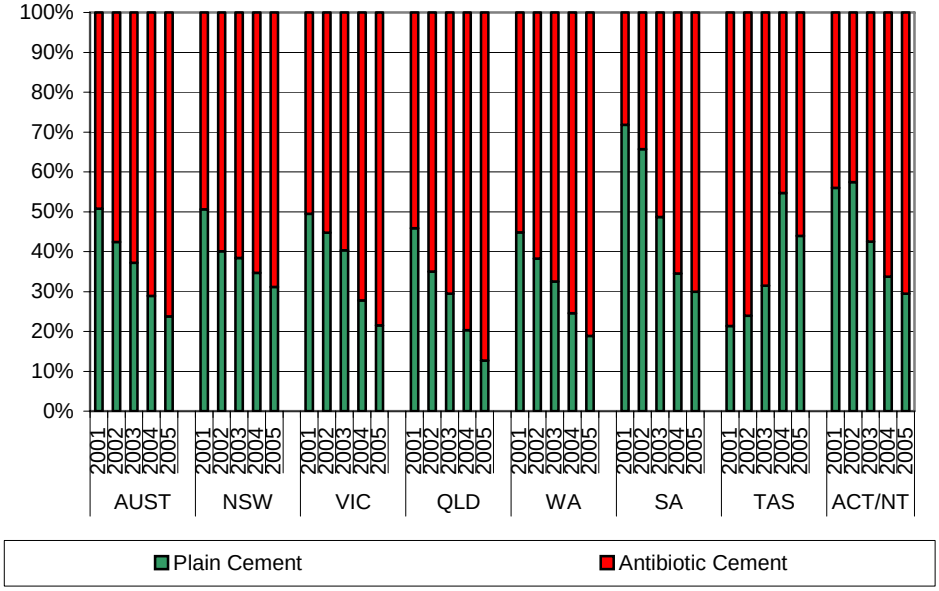


Table C1: Primary Hip Replacement - Top Ten Cements used by Location

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Simplex P-	14503	27.5	CMW 1 Plain	2337	18.2
Simplex Tobra-*	10644	20.2	Simplex Tobra*	2269	17.7
Antibiotic Simplex*	10387	19.7	Simplex P	1905	14.9
CMW 1 Plain	3364	6.4	Palacos R*	1497	11.7
CMW 1G*	3150	6.0	CMW 1G*	1335	10.4
Palacos R*	2843	5.4	Antibiotic Simplex*	1282	10.0
CMW 3G*	1481	2.8	CMW 2G*	779	6.1
Palamed G*	1381	2.6	CMW 2 Plain	584	4.6
Palacos E*	1133	2.1	Palamed G*	518	4.0
CMW 3 Plain-	715	1.4	CMW 3G*	90	0.7
Other types (28)	3153	6.0	Other types (20)	231	1.8
Total	**52754**	**100.0**	**Total**	**12827**	**100.0**

Note: *primary hip replacement does not include resurfacing and thrust plates*
*more than one type of cement was used in some procedures, * denotes cement with antibiotic*

Table C2: Revision Hip Replacement - Top Ten Cements used by Location

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Simplex Tobra*	978	27.6	CMW 1G*	843	22.9
Antibiotic Simplex*	843	23.8	Simplex Tobra*	624	17.0
Simplex P	454	12.8	Palacos R*	607	16.5
Palacos R*	313	8.8	Antibiotic Simplex*	480	13.0
CMW 1G*	308	8.7	CMW 1 Plain	286	7.8
Palamed G*	155	4.4	Palamed G*	230	6.3
CMW 1 Plain	133	3.8	CMW 2G*	213	5.8
CMW 3G*	93	2.6	Simplex P	199	5.4
Palacos E*	62	1.8	CMW 2 Plain	98	2.7
CMW 2G*	37	1.0	CMW 3G*	28	0.8
Other types (20)	165	4.7	Other types (15)	71	1.9
Total	**3541**	**100.0**	**Total**	**3679**	**100.0**

Note: *more than one type of cement was used in some procedures, * denotes cement with antibiotic*

Table C3: Primary Knee Replacement - Top Ten Cements used by Location

Femur	*N*	*%*	*Tibia*	*N*	*%*	*Patella*	*N*	*%*
CMW 1G-*	10894	15.4	CMW 1G*	14429	14.7	Antibiotic Simplex*	5775	13.3
Palacos R*	8780	12.4	Simplex P	12526	12.8	CMW 1G*	5445	12.5
Simplex P	8292	11.7	CMW 1 Plain	11640	11.9	CMW 2 Plain	4945	11.4
CMW 1 Plain	8092	11.4	Palacos R*	10491	10.7	Palacos R*	4816	11.1
Palamed G*	8056	11.4	Antibiotic Simplex*	10233	10.4	Simplex P	4741	10.9
Antibiotic Simplex*	7754	10.9	Simplex Tobra*	9850	10.0	Simplex Tobra*	4719	10.9
Simplex Tobra*	7057	10.0	CMW 2 Plain	9723	9.9	Palamed G*	4568	10.5
CMW 2 Plain	5097	7.2	Palamed G*	9321	9.5	CMW 1 Plain	4465	10.3
CMW 2G*	4656	6.6	CMW 2G*	6673	6.8	CMW 2G*	2419	5.6
CMW 3G*	372	0.5	CMW 3G*	763	0.8	Cemex Gent HV*	355	0.8
Other types (26)	1817	2.6	Other types (25)	2463	2.5	Other types (23)	1197	2.8
Total	**70867**	**100.0**	**Total**	**98112**	**100.0**	**Total**	**43445**	**100.0**

Note: *more than one type of cement was used in some procedures, * denotes cement with antibiotic*

Table C4: Revision Knee Replacement - Top Ten Cements used by Location

Femur	*N*	*%*	*Tibia*	*N*	*%*	*Patella*	*N*	*%*
CMW 1G*	1234	21.0	CMW 1G*	1479	21.6	CMW 1G*	806	16.3
Palacos R*	971	16.5	Palacos R*	1068	15.6	CMW 2 Plain	757	15.3
Antibiotic Simplex*	748	12.7	Simplex Tobra*	827	12.1	Palacos R*	634	12.8
Simplex Tobra*	741	12.6	Antibiotic Simplex*	821	12.0	CMW 2G*	541	10.9
Palamed G*	672	11.4	Palamed G*	724	10.6	Simplex Tobra*	513	10.4
CMW 2G*	460	7.8	CMW 2G*	547	8.0	Antibiotic Simplex*	495	10.0
Simplex P	317	5.4	CMW 2 Plain	384	5.6	Palamed G*	390	7.9
CMW 1 Plain	283	4.8	CMW 1 Plain	372	5.4	Simplex P	368	7.4
CMW 2 Plain	248	4.2	Simplex P	358	5.2	CMW 1 Plain	296	6.0
CMW 3G*	53	0.9	CMW 3G*	69	1.0	CMW 3G*	40	0.8
Other types (18)	161	2.7	Other types (21)	203	3.0	Other types (17)	116	2.3
Total	**5888**	**100.0**	**Total**	**6852**	**100.0**	**Total**	**4956**	**100.0**

Note: *more than one type of cement was used in some procedures, * denotes cement with antibiotic*

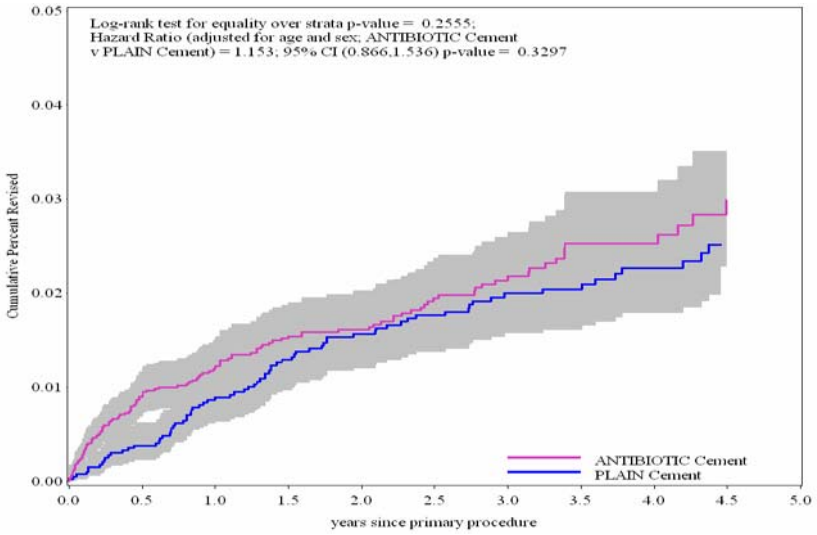
Table C5: Revision Rates for Cemented Primary Total Hips for Osteoarthritis by Cement Type and Location

Antibiotic Status		*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral	*Acetabular*						
Antibiotic	Antibiotic	103	5779	1.8	13703	0.8	(0.61, 0.91)
Antibiotic	Non-Ab	5	179	2.8	487	1.0	(0.33, 2.40)
Non-Ab	Antibiotic	13	542	2.4	1301	1.0	(0.53, 1.71)
Non-Ab	Non	79	4030	2.0	13003	0.6	(0.48, 0.76)
Total		**200**	**10530**	**1.9**	**28494**	**0.7**	**(0.61, 0.81)**

Table C6: Revision Rates for Cemented Primary Total Hips for Osteoarthritis by Cement Type

Antibiotic Status	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Antibiotic (in at least one location)	121	6500	1.9	15491	0.8	(0.65, 0.93)
Non-Ab	79	4030	2.0	13003	0.6	(0.48, 0.76)
Total	**200**	**10530**	**1.9**	**28494**	**0.7**	**(0.61, 0.81)**

Figure C3: Cumulative percentage revision of Cemented Primary Total Hips for Osteoarthritis by Cement Type



Antibiotic Status	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Antibiotic	6500	5792	5080	4315	3637	2946	2303	1672	1089	623	252
Non-Ab	4030	3801	3596	3363	3068	2772	2355	1921	1431	963	493

Table C7: Yearly cumulative percentage revision of Cemented Primary Total Hips for Osteoarthritis by Cement Type

Antibiotic Status	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Antibiotic	1.21 (0.96, 1.52)	1.61 (1.32, 1.98)	2.14 (1.76, 2.60)	2.53 (2.08, 3.08)
Non-Ab	0.89 (0.64, 1.25)	1.56 (1.21, 2.02)	2.00 (1.58, 2.53)	2.26 (1.80, 2.85)

Table C8: Revision Diagnosis for Hips (diagnosis OA) by Cement Status

Diagnosis	*Antibiotic*		*Non-Antibiotic*	
	N	*%*	*N*	*%*
Dislocation of Prosthesis	54	0.8	22	0.5
Fracture	10	0.2	6	0.1
Infection	19	0.3	21	0.5
Loosening	37	0.6	32	0.8
Other	8	0.1	5	0.1
Total	**128**	**2.0**	**85**	**2.0**

Note: *some patients had multiple diagnoses*

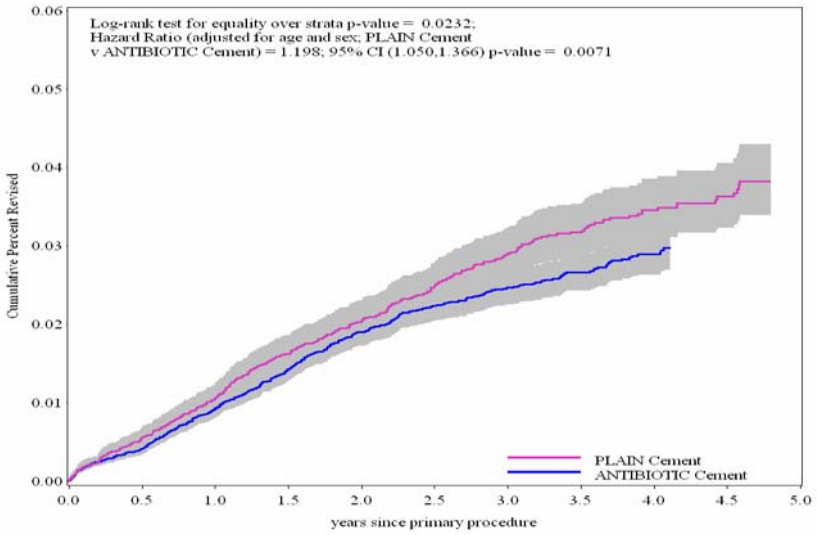
Table C9: Revision Rates for Cemented Primary Total Knees for Osteoarthritis by Cement Type and Location

Antibiotic Status		*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral	*Tibial*						
Antibiotic	Antibiotic	594	35471	1.7	71120	0.8	(0.77, 0.91)
Antibiotic	Non-Ab	3	375	0.8	838	0.4	(0.07, 1.05)
Non-Ab	Antibiotic	6	180	3.3	404	1.5	(0.54, 3.23)
Non-Ab	Non	360	14233	2.5	39276	0.9	(0.82, 1.02)
Total		**963**	**50259**	**1.9**	**111637**	**0.9**	**(0.81, 0.92)**

Table C10: Revision Rates for Cemented Primary Total Knees for Osteoarthritis by Cement Type

Antibiotic Status	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Antibiotic (in at least one location)	603	36026	1.7	72361	0.8	(0.77, 0.90)
Non-Ab	360	14233	2.5	39276	0.9	(0.82, 1.02)
Total	**963**	**50259**	**1.9**	**111637**	**0.9**	**(0.81, 0.92)**

Figure C4: Cumulative percentage revision of Cemented Primary Total Knees for Osteoarthritis by Cement Type



Antibiotic Status	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5*
Antibiotic	36026	30519	25067	20235	15936	12439	9322	6644	3979	2024	871
Non-Ab	14233	13111	11826	10640	9389	7965	6410	5045	3544	2142	1017

Table C11: Yearly cumulative percentage revision of Cemented Primary Total Knee for Osteoarthritis by Cement Type

Antibiotic Status	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Antibiotic	0.93 (0.83, 1.05)	1.90 (1.74, 2.08)	2.47 (2.26, 2.69)	2.90 (2.64, 3.18)
Non-Ab	1.05 (0.89, 1.24)	2.04 (1.80, 2.30)	2.89 (2.58, 3.23)	3.46 (3.10, 3.86)

Table C12 Revision Diagnosis for Knees (diagnosis OA) for Cement Status

Diagnosis	*Antibiotic*		*Non-Antibiotic*	
	N	*%*	*N*	*%*
Fracture	19	0.1	10	0.0
Infection	195	0.5	98	0.7
Loosening	165	0.5	110	0.8
Lysis	8	0.0	6	0.0
Pain	65	0.2	31	0.2
Other	195	0.5	129	0.9
Total	**647**	**1.8**	**384**	**2.6**

Note: *some patients had multiple diagnoses*

Mortality Following Joint Replacement Surgery

Introduction

Mortality information has been obtained by matching Registry data with the National Death Index (NDI), a database maintained by the Australian Institute of Health and Welfare (AIHW). Access by the Registry to this database has been obtained following approval of an application to the AIHW.

The NDI data is for deaths after the commencement of the Registry to the 31st December 2005. This corresponds to the same period used for the analysis of procedure data.

Analysis and Presentation of Mortality data

Adjusted mortality is obtained after direct standardisation of the crude cumulative mortality data by 5-year age intervals and by sex to the Estimated Resident Population Status based on the 2001 census. As the total population has a younger age structure than that of the subjects in the Registry, the adjusted mortality is substantially lower than the crude mortality. By minimising the effects of differences in age and sex among groups, the adjusted measure may be used to compare the mortality of different procedures and will become useful in comparing mortality over time.

The rate per 100 person years has been calculated from the date of procedure to either the date of death or the date of the end of the valid death search by the Australian Institute of Health and Welfare (31st December 2005). This provides a true rate. Exact confidence intervals based on the Poisson distribution of the number of observed deaths are also given.

Mortality Associated with Hip Replacement

Mortality associated with hip replacement varies depending on the category of hip replacement procedure that has been undertaken.

As would be anticipated, the crude cumulative mortality of primary partial hip procedures is 40.0% compared to primary total hips of 5.0%. The mortality rate per 100 person years is also higher in primary partial compared to primary total hip (23.68 and 2.08 respectively). This difference is not eliminated after adjusting for age and sex; standardised mortality is 22.0% for partial hips and 1.9% for total hips (SMR = 12). The risk of death for partial hip replacement is 6 times greater than primary total hips (hazard ratio =5.995; 95% CI (5.732, 6.270) $p<0.0001$) (Table M1 and Figure M1). The principal diagnosis for primary partial hip is fractured neck of femur and this group is vastly different with respect to associated co-morbidities and other factors that may contribute to mortality compared to primary total hip.

There are also differences when comparing different types of partial hip replacement (Figure M2). Cumulative mortality and rate per 100 person years are increased in unipolar monoblock prostheses compared to unipolar modular and bipolar prostheses. After correcting for age and sex the differences are not as evident (Table M2). There is a difference in mortality when the two principal types of unipolar monoblock prostheses are compared. The use of the Austin Moore prosthesis is associated with an increased mortality compared to the Thompson prosthesis (Table M3 and Figure M3).

There is a difference in mortality between primary and revision hip procedures. The crude mortality for primary total hips is 5.4% and for revisions, 10.3%. After standardisation for age and gender there is still a difference in the mortality rate for each procedure, 2.1% for primary hips and 2.5% for revisions (Table M3).

Mortality Associated with Knee Replacement

The mortality figures for the different knee replacement procedures indicate that there is a trend towards increased mortality

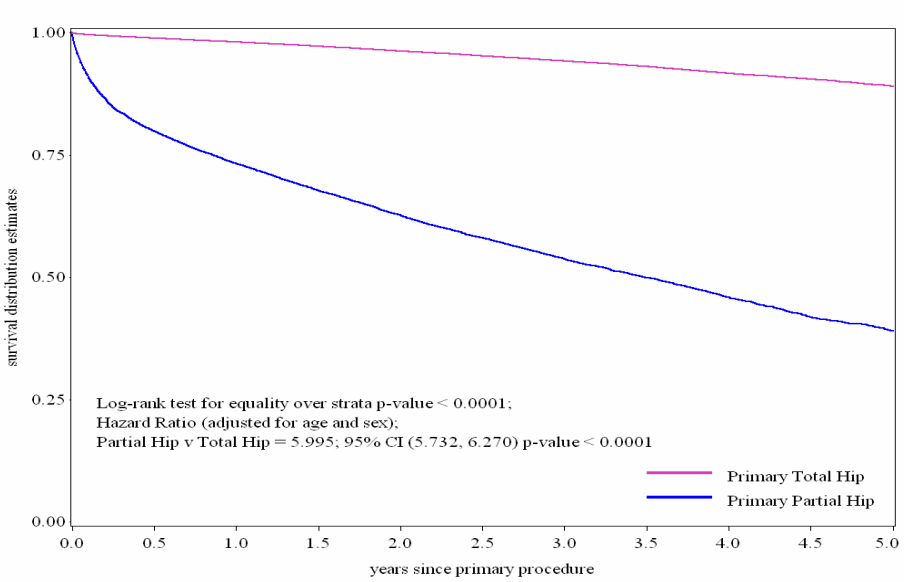
related to the extent of the procedure undertaken. Six deaths have been identified during the period of observation for patellar/trochlear procedures. Mortality is less following unicompartmental knee replacement compared to primary total knee replacement. Revision knee replacement has a higher mortality than primary total knee replacement. This trend is still evident after adjustment for age and sex. The risk of death for total knees is 1.5 times greater than unicompartmental knees (hazard ratio = 1.509; 95% CI (1.350, 1.687) $p < 0.0001$) (Table M6 and Figure M 4).

Table M1: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2005

Type of hip replacement	*Number who died*	*Number of patients*	*Cumulative mortality (% who died)*	*Standardised Mortality*	*Person-years*	*Rate per 100 person years*	*Exact 95% CI*
Primary Partial Hip	8473	21209	40.0	22.0365	35776	23.68	(23.18, 24.19)
Primary Total Hip	4032	80707	5.0	1.8525	193794	2.08	(2.02, 2.15)
Revision Hip	1093	10650	10.3	2.5323	27446	3.98	(3.75, 4.23)
Total	**13598**	**112566**	**12.1**	**3.1808**	**257016**	**5.29**	**(5.20, 5.38)**

Note: *Primary Total includes resurfacing and Thrusts plates.*

Figure M1: Kaplan-Meier Survival - following Hip Procedure



Type of hip replacement	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Primary Partial Hip	21209	15181	12342	9862	7749	5904	4378	2993	1884	1036	500
Primary Total Hip	80707	71607	62589	53997	45303	37236	29100	21384	13960	7983	3587

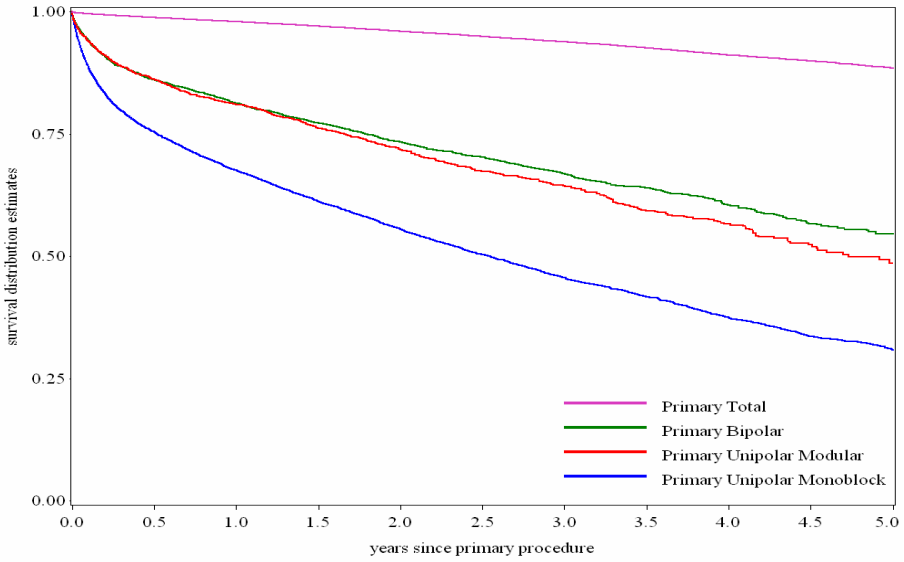
Table M2: Yearly percent survival of type of hip replacement

Type of hip replacement	*Cumulative Percent Survial (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Partial Hip	73.3 (72.64, 73.88)	62.7 (61.98, 63.42)	53.8 (52.94, 54.58)	45.9 (44.92, 46.87)	39.0 (37.71, 40.31)
Total Hip	98.1 (98.02, 98.22)	96.3 (96.12, 96.41)	94.2 (94.03, 94.44)	91.7 (91.41, 91.99)	89.1 (88.59, 89.51)

Table M3: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2004 (Table M1 expanded)

Type of hip replacement	*Number who died*	*Number of patients*	*Cumulative mortality (% who died)*	*Standardised Mortality*	*Person-years*	*Rate per 100 person years*	*Exact 95% CI*
Primary Bipolar	1635	5777	28.3	20.9531	10816	15.12	(14.39, 15.87)
Primary Unipolar Mono	5964	12163	49.0	12.8023	19923	29.94	(29.18, 30.71)
Austin-Moore Type	4697	9264	50.7	13.2186	15302	30.70	(29.82, 31.59)
ETS	25	146	17.1	3.7044	83	29.98	(19.40, 44.26)
Thompson Type	1242	2753	45.1	14.3566	4537	27.37	(25.87, 28.94)
Primary Unipolar Modular	874	3269	26.7	14.9867	5038	17.35	(16.22, 18.54)
Primary Resurfacing	39	6307	0.6	0.2718	13866	0.28	(0.20, 0.38)
Primary Thrust Plate	2	110	1.8	1.1559	338	0.59	(0.07, 2.14)
Primary Total	3991	74290	5.4	2.0993	179590	2.22	(2.15, 2.29)
Revision	1093	10650	10.3	2.5323	27446	3.98	(3.75, 4.23)
Total	**13598**	**112566**	**12.1**	**3.1808**	**257016**	**5.29**	**(5.20, 5.38)**

Figure M2: Kaplan-Meier Survival - following Hip Procedure including Types of Partials

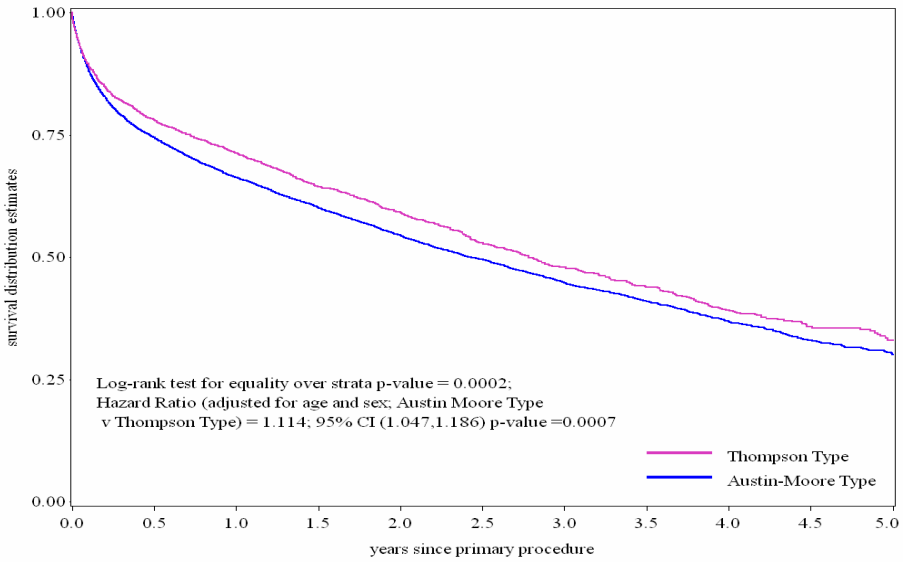


Type of hip replacement	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Primary Bipolar	5777	4449	3743	3056	2441	1899	1393	903	532	283	152
Primary Unipolar Mono	12163	8456	6809	5432	4259	3267	2454	1721	1099	606	280
Primary Unipolar Mod	3269	2276	1790	1374	1049	738	531	369	253	147	68
Primary Total Hip	74290	65954	57723	49878	41904	34527	27058	20033	13209	7650	3482
Revision Hip	10650	9511	8535	7538	6521	5431	4366	3341	2285	1321	626

Table M4: Yearly percent survival of type of hip replacement

Type of hip replacement	*Cumulative Percent Survival (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Prim Bipolar	81.3 (80.25, 82.34)	73.4 (72.11, 74.64)	66.9 (65.37, 68.33)	60.5 (58.61, 62.35)	54.6 (52.00, 57.20)
P Unipolar Mono	67.6 (66.70, 68.42)	55.6 (54.63, 56.56)	45.6 (44.53, 46.65)	37.5 (36.32, 38.69)	30.9 (29.36, 32.38)
P Unipolar Mod	81.0 (79.52, 82.42)	71.9 (70.03, 73.72)	64.4 (62.07, 66.58)	56.6 (53.69, 59.41)	48.5 (44.39, 52.52)
Prim Total Hip	98.1 (98.02, 98.22)	96.3 (96.12, 96.41)	94.2 (94.03, 94.44)	91.7 (91.41, 91.99)	89.1 (88.59, 89.51)
Revision Hip	81.3 (80.25, 82.34)	73.4 (72.11, 74.64)	66.9 (65.37, 68.33)	60.5 (58.61, 62.35)	54.6 (52.00, 57.20)

Figure M3: Kaplan-Meier Survival - following Unipolar Monoblock Primary



Type of hip replacement	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Austin-Moore Type	9264	6442	5216	4212	3304	2546	1909	1323	834	450	194
Thompson Type	2753	1942	1561	1217	955	721	545	398	265	156	86

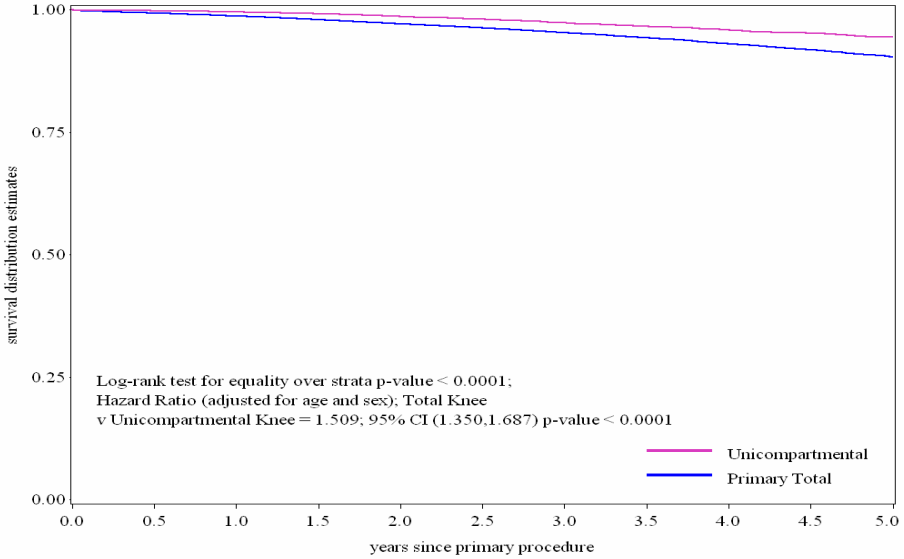
Table M5: Yearly percent survival of type of hip replacement

Type of hip replacement	*Cumulative Percent Survival (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Austin-Moore	66.4 (65.36, 67.33)	54.5 (53.39, 55.58)	44.8 (43.61, 45.99)	36.9 (35.60, 38.27)	30.2 (28.44, 31.88)
Thompson Type	71.3 (69.48, 73.00)	59.1 (57.02, 61.12)	48.0 (45.66, 50.28)	39.2 (36.60, 41.79)	33.1 (29.92, 36.24)

Table M6: Number and percentage of people who died following Knee Replacement for Knee procedure between September 1999 and December 2005

Type of knee replacement	*Number who died*	*Number of patients*	*Cumulative mortality (% who died)*	*Standardised Mortality*	*Person-years*	*Rate per 100 person years*	*Exact 95% CI*
Patellar/trochlear	6	548	1.1	0.41071	1194	0.50	(0.18, 1.09)
Unicompartmental	343	15424	2.2	0.71220	37923	0.90	(0.81, 1.01)
Primary Total	3525	88388	4.0	6.23535	209198	1.69	(1.63, 1.74)
Revision	489	6411	7.6	2.18032	17809	2.75	(2.51, 3.00)
Total	**4363**	**110771**	**3.9**	**5.80513**	**266124**	**1.64**	**(1.59, 1.69)**

Figure M4: Kaplan-Meier Survival - following Knee Procedure



Type of knee replacement	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*
Unicompartmental	15424	13921	12331	10829	9239	7544	5803	4106	2567	1296	560
Primary Total	88388	78205	67699	58334	48769	40091	30935	22865	14621	8198	3844

Table M7: Yearly percent survival of type of knee replacement

Type of knee replacement	*Cumulative Percent Survival (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Uni	99.6 (99.45, 99.67)	98.6 (98.42, 98.84)	97.4 (97.01, 97.67)	95.9 (95.34, 96.34)	94.4 (93.46, 95.13)
Total Knee	98.7 (98.65, 98.81)	97.2 (97.02, 97.28)	95.3 (95.14, 95.51)	93.1 (92.82, 93.35)	90.4 (89.92, 90.81)

Appendix 1

GLOSSARY OF STATISTICAL TERMS

Adjustment: The process of re-estimating a crude measure, such as a rate or rate ratio, to minimise the effects of a difference in the distribution of a characteristic, such as age, between groups being compared on that measure. Adjustment may be carried out in the context of a modelling procedure, for example, linear regression, or by standardising the data set against a reference population with a known age distribution, for example, the World Standard Population or the Australian population defined by the Australian Bureau of Statistics Census in 2001.

Censoring: When the outcome of interest is the *time* to a defined event, for example death or revision of a prosthesis, the event may not occur during the available period of observation. For example, the Registry analyses its data on prosthesis failure in July each year, and of course many (hopefully most!) prostheses will not have failed by that time. Effectively *we do not know the outcome unless the prosthesis failed before July*. For the majority, we only know that, up until July, they had not yet failed. The times to failure for these prostheses are said to have been **censored** in July. Statistical methods exist to ensure that *censored data are not ignored in analysis*; rather information on survival up until the time of censoring is used to give the best possible estimates of survival or failure probabilities.

Chi-Square Test (χ^2) Test: Any test whose statistic has a chi-square distribution under the null hypothesis is called a chi-square test. A common example is a test for association between two categorical variables whose data are arrayed in a cross-classification table of counts (Pearson's chi-square test). This can be generalised to many situations where the distribution of observed data is being compared to an expected, theoretical distribution.

Confidence Interval: A set of values for a summary measure, for example a rate or a rate ratio, constructed so that this set has a specified probability of including the true value of the measure. The specified probability is called the confidence level, and the end points of the confidence interval are called the lower and upper confidence limits. 95% confidence intervals are most common.

Cox Model or Proportional Hazards Model: A statistical model that relates the hazard for an individual at any time t to an (unspecified) baseline hazard and a set of predictor variables, such as treatment type, age, sex etc. The Cox model produces hazard ratios that allow comparisons between groups of the rate of the event of interest.

Cumulative Percent Revised: otherwise known as the "cumulative failure rate". This is defined as 100 x [1- S(t)] where S(t) is the survivorship probability estimated by the Kaplan-Meier method (see **survival curve**, below). The CPR gives the percent of procedures revised up until time t, and allows for right censoring due to death or closure of the database for analysis.

Hazard Rate: A measure of the instantaneous risk of occurrence of an event, for example death, at a point in time, t. It is sometimes called the "force of mortality". A hazard ratio results from dividing one group's hazard by another's to give a comparative measure of the instantaneous risk of experiencing the event of interest.

Incidence Rate: The number of new occurrences of an event divided by a measure of the population at risk of that event over a specified time period. The population at risk is often given in terms of person-time: for example, if 6 persons are each at risk over 4 months, they contribute 6 x 1/3 = 2 person-years to the denominator of the incidence rate. The incidence rate ratio (IRR) is commonly used to compare the incidence rates of two groups. If the two groups incidence rates are the same, an IRR of 1 results.

Log Rank Test: A family of statistical tests that compares the survival experience of two or more groups over the entire time of observation (contrast with comparison of survival at a defined time, for example, five-year survival.)

Survival Curve: A plot of the proportion of subjects who have not yet experienced a defined event (for example death, revision of prosthesis) versus time. The Kaplan-Meier method is the one most commonly used. The curve takes account of subjects whose ultimate survival time is not known, a phenomenon called "**censoring**". The survival estimate at each time is accompanied by a confidence interval based on the method of Greenwood. An interval is interpretable only at the time for which it was estimated and the sequence of intervals (depicted as shading on the Kaplan-Meier curve) cannot be used to judge the significance of any perceived difference over the entire time course.

Appendix 2

PATIENT CONSENT AND CONFIDENTIALITY GUIDELINES

Patient Consent

The Registry obtains consent to include information from individuals undergoing joint replacement. This is done by using the 'opt off' approach. The implementation of the new Commonwealth Legislation at the end of 2001 resulted in the Registry meeting the Privacy Commission to ensure that the system used for patient consent is within the privacy guidelines.

Using this approach, patients are provided with a Patient Information Sheet. This explains what information is required, how it is collected and the avenues to take should an individual not want their information included in the Registry. The information is clearly explained. The information is provided to patients by surgeons and hospitals prior to surgery. To accommodate those patients that may wish to opt off, or have enquires or issues to discuss, a freecall number *(no cost to the patient*) has been implemented at the Registry.

Patient Confidentiality

Joint replacement patients will not be contacted directly by the Registry. No individual patient will be identified during analysis or in the reports and publications produced by the Registry. Patient operative and prostheses data will be managed in accordance with the Guidelines for the Protection of Privacy in the Conduct of Medical Research. Personal data collected are for use by the AOA National Joint Replacement Registry only. Further to this the Registry is a Federal Quality Assurance Activity *(see below)* and all information is protected.

Data Management & Confidentiality

The Data Management and Analysis Centre, University of Adelaide undertakes data entry, validation and analysis and provides secure data storage.

The DMAC was established in 1995. Dr Philip Ryan, Associate Professor in Public Health, heads the DMAC. The centre staff includes data managers, database programmers, statisticians and data assistants from the Department of General Practice and the Department of Public Health. It is engaged in an increasing variety of work, including clinical trials, pharmacoepidemiological studies, consultations and cohort studies.

The list of personnel with access to identified Registry information is as follows:

- Director Professor Stephen Graves
- Deputy Director Dr. David Davidson
- Coordinator Ms Lisa Ingerson
- Data Management and Analysis Centre Staff including data assistants and data manager, statisticians and programmers.

Declaration of the project as a Quality Assurance Activity ensures that Registry and DMAC staff are bound to maintain confidentiality. Confidentiality not only applies to individual patients but also includes surgeons and hospitals.

The DMAC has security systems to limit access to DMAC and Registry staff only. There are policies and procedures in place as well as software barriers to protect personal information. These include the use of codes, passwords and encryption.

The proforma used for data collection will be stored in a secure locked room at the DMAC. After a period of time the forms will be scanned and electronically stored. As with all data these will be securely stored. All data will be retained in accordance with good scientific practice.

Surgeon Confidentiality

Surgeon confidentiality is assured. The purpose of the Registry is to provide demographic and outcome information relevant to joint replacement surgery. It is not designed or capable of monitoring the performance of individual surgeons. Surgeon name is not recorded in the Registry database. In addition to this, the AOA Registry Management Committee made a decision in October 1999 to remove surgeon name from any Registry forms. The Board of the AOA ratified this decision. As a consequence of this, Registry staff blackout surgeon name, whether it is hand written or printed on the hospital patient identification, on all forms received by the Registry.

It has always been thought however, that it is an important Registry function to provide a service to surgeons that allows them to monitor and audit their own performance. It is for this reason that surgeons have a choice to identify themselves by code. In this manner specific procedures can be linked with that code. This is an optional choice and there is no requirement that the surgeon code be completed. The codes are provided to surgeons by the AOA and Registry staff do not have access to those codes.

The intention is to provide surgeons with access to their own information through secure internet access. As yet the software has not been developed that would allow this to occur. It is important to emphasise that surgeons have the choice of using their code and that surgeon name is not recorded and also permanently removed from any of the Registry forms.

Federal Quality Assurance Activity

The Australian Orthopaedic Association National Joint Replacement Registry was declared a Federal Quality Assurance Activity by the then Federal Minister for Health and Aged Care, Dr Wooldridge, in March 1999 and again in November 2001. This ensures freedom from subpoena and absolute confidentiality of information held by the Registry.

The Quality Assurance legislation is part of the Health Insurance Act of 1973. This act was amended in 1992 to include quality assurance confidentiality. The Act operates on the underlying assumption that quality assurance activities are in the public interest.

A declaration as a quality assurance activity by the Commonwealth Minister of Health and Aged Care prohibits the disclosure of information, which identifies individual patients or health care providers that is known solely as a result of the declared quality assurance activity. It is not possible to provide identifying information to any individual or organisation including the government.

The protection provided by the declaration assures surgeons, hospitals and government that information supplied to the Registry remains confidential and secure. The act also protects persons engaging in those activities in good faith from civil liability in respect of those activities.

The declaration of the Registry as a Quality Assurance Activity is for an initial five-year period but covers information collected during this period indefinitely.

Appendix 3

AUSTRALIAN ORTHOPAEDIC ASSOCIATION NATIONAL JOINT REPLACEMENT REGISTRY

PATIENT INFORMATION

INTRODUCTION - *about the Registry*

You are about to have a joint replacement. Joint replacement is very successful and most people do not require any further surgery following this procedure. However, a number of people who have a joint replacement may at some time in the future require another operation on that joint. This may occur due to a variety of reasons; the most common being that the joint replacement has worn out. Furthermore, differences between the many types of artificial joints available may affect the time at which they wear out and require replacing. In order to improve the success of this surgery, the Australian Orthopaedic Association has set up a National Joint Replacement Registry so that joint replacement and prostheses can be monitored.

The purpose of the Registry is to assess the performance of all joint replacement. If a joint replacement is identified as having a problem, the Registry can assist hospitals to locate those people that may be effected. To do this it is important to record information on every person having a joint replacement. Approximately 50,000 people have joint replacement surgery each year in Australia. It is also important to record details on any subsequent operations and the reason the surgery was performed. By analysing this information it will be possible to identify the cause of any problems as well as determine which types of joint replacement have the best results. To be successful, the Registry needs to gather information on as many people having hip or knee replacement surgery as possible. We are asking you to participate in the Registry, by allowing us to document information relevant to your operation.

Your Involvement - *the information we need*

The information we require includes your name, date of birth, address, Medicare number, hospital identity number, the name of the hospital and the reason you are having a joint replacement. This information is necessary to accurately link you to the artificial joint inserted as well as linking any following joint surgery you may have, to your previous records. We will also record the day of the operation, which joint was operated on and the type of artificial joint used. No other personal information is recorded. Hospitals and government will send reports to the Registry on a regular basis to validate the information collected.

Information - *how we will keep your information confidential*

Your personal information is confidential and cannot be used outside the Registry. Procedures are in place to protect your information and to keep it confidential. When your details have been entered into the Registry your record will be given a specific Registry number. In addition you cannot be identified in any reports produced by the Registry.

How we will collect the information

Although we are asking to record your operation details in the Registry you are not required to do anything. Your surgeon and/or theatre staff will complete the form that contains your personal details at the time of your operation and send it to us. The information will be entered into the Registry computer.

Risks and Benefits - *to you*

There are no risks to you by having your details in the Registry. Your information is protected and we are not allowed to identify you by law.

The Registry will produce general reports on a variety of factors that influence the success of joint replacement surgery. This will improve the quality of future joint replacement surgery.

What to do if you don't want to be in the Registry

We understand that not everyone is comfortable about having his or her personal details documented in a Registry. If you feel this way and do not want your details recorded please contact Ms Lisa Ingerson, Project Coordinator, on 1800 068 419 *(freecall)*. A decision on whether or not you wish to be involved in the Registry does not affect your treatment in any way. If you have any questions, concerns or require further information on the National Joint Replacement Registry please do not hesitate to contact Ms. Lisa Ingerson.

Appendix 4

ICD-10-AM AND CMBS CODES

The Registry identified the following ICD-10-AM and CMBS codes for data collection.

ICD-10-AM CODES
HIP PROCEDURES

Primary Total Hip replacement

Partial Hip	49315-00	partial arthroplasty (excludes Austin Moore)
	47522-00	austin moore
Single	49318-00	total arthroplasty of hip unilateral
Bilateral	49319-00	total arthroplasty of hip bilateral

Revision Hip

49312-00	excision arthroplasty of hip (removal of prosthesis without replacement)
49324-00	revision of total arthroplasty of hip
49327-00	revision of total arthroplasty with bone graft to acetabulum
49330-00	revision of total arthroplasty with bone graft to femur
49333-00	revision of total arthroplasty with bone graft to acetabulum and femur
49339-00	revision of total arthroplasty of hip with anatomic specific allograft to acetabulum
49342-00	revision of total arthroplasty of hip with anatomic specific allograft to femur
49345-00	revision of total arthroplasty with anatomic specific allograft to acetabulum and femur
49346-00	revision of partial arthroplasty hip replacement

KNEE PROCEDURES

Patellofemoral joint of knee

49534-00	total replacement arthroplasty of patellofemoral joint of knee

Unicompartmental knee

49517-00	hemi arthroplasty of knee

Total knee

Single	49518-00	total arthroplasty of knee uinlateral
Bilateral	49519-00	total arthroplasty of knee bilateral
	49521-00	total arthroplasty of knee with bone graft to femur unilateral
	49521-01	total arthroplasty of knee with bone graft to femur bilateral
	49521-02	total arthroplasty of knee with bone graft to tibia unilateral
	49521-03	total arthroplasty of knee with bone graft to tibia bilateral
	49524-00	total arthroplasty of knee with bone graft to femur and tibia unilateral
	49524-01	total arthroplasty of knee with bone graft to femur and tibia bilateral

Revision knee

49512-00	arthrodesis with removal of prosthesis
49515-00	removal-prostheses from knee
49527-00	revision of total arthroplasty of knee
49530-00	revision of total arthroplasty of knee with bone graft to femur
49530-01	revision of total arthroplasty of knee with bone graft to tibia
49533-00	revision of total arthroplasty of knee with bone graft to femur and tibia
49554-00	revision of total arthroplasty of knee with anatomic specific allograft

Appendix 4 cont.

CMBS CODES
HIP PROCEDURES

Partial hip

49315 HIP, arthroplasty of, unipolar or bipolar

Primary hip

49309 HIP, arthrectomy or excision arthroplasty of, including removal of prosthesis (austin moore or similar (non-cement))
49318 HIP, total replacement arthroplasty of, including minor bone grafting
49319 HIP, total replacement arthroplasty of, including major bone grafting, if performed-bilateral
49321 HIP, total replacement arthroplasty of, including major bone grafting, including obtaining of graft

Revision hip

49312 HIP, arthrectomy or excision arthroplasty of, including removal of prosthesis cemented, porous coated of similar)
49324 HIP, total replacement arthroplasty of, revision procedure including removal of prosthesis
49327 HIP, total replacement arthroplasty of, revision procedure requiring bone grafting to acetabulum, including obtaining of graft
49330 HIP, total replacement arthroplasty of, revision procedure requiring bone grafting to femur, including obtaining of graft
49333 HIP, total replacement arthroplasty of, revision procedure requiring bone grafting to both acetabulum and femur, including obtaining of graft
49336 HIP, revision of a fracture of the femur where revision total hip replacement is required as part of the treatment of the fracture
49339 HIP, revision total hip replacement of, requiring anatomic specific allograft of proximal femur greater than 5cm in length
49342 HIP, revision total hip replacement of, requiring anatomic specific allograft of acetabulum
49345 HIP, revision total hip replacement of, requiring anatomic specific allograft of both femur and acetabulum
49346 HIP, revision arthroplasty with replacement of acetabular liner or ceramic head, not requiring removal of femoral component or acetabular shell

Appendix 4 cont.

CMBS CODES

KNEE PROCEDURES

Patellofemoral joint of knee

49534 KNEE, patellofemoral joint of, total replacement arthroplasty as a primary procedure

Unicompartmental knee

49517 KNEE, hemiarthroplasty of

Primary knee

49518 KNEE, total replacement arthroplasty of,

49519 KNEE, total replacement arthroplasty of, including associated minor grafting, if performed-bilateral

49521 KNEE, total replacement arthroplasty of, requiring major bone grafting to femur or tibia, including obtaining of graft

49524 KNEE, total replacement arthroplasty of, requiring major bone grafting to femur and tibia, including obtaining of graft

Revision knee

49512 KNEE, arthrodesis of, with removal of prosthesis

49515 KNEE, removal of prosthesis, cemented or uncemented, including associated cement, as the first stage of a 2 stage procedure

49527 KNEE, total replacement arthroplasty of, revision procedure, including removal of prosthesis

49530 KNEE, total replacement arthroplasty of, revision procedure, requiring bone grafting to femur or tibia, including obtaining of graft and including removal of prosthesis

49533 KNEE, total replacement arthroplasty of, revision procedure, requiring bone grafting to femur and tibia, including obtaining of graft and including removal of prosthesis

49554 KNEE, revision of total replacement of, by anatomic specific allograft of tibia or femur