AUSTRALIAN ORTHOPAEDIC ASSOCIATION

NATIONAL JOINT REPLACEMENT REGISTRY

Annual Report

2007

AUSTRALIAN ORTHOPAEDIC ASSOCIATION NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT

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ANNUAL REPORT
2007

Hip and Knee Replacement from
September 1999 to December 2006

INDEX

LIST OF TABLES

PRIMARY TOTAL

REVISION

KNEE REPLACEMENT

GENERAL

UNISPACER AND PATELLA/TROCHLEAR

UNICOMPARTMENTAL

PRIMARY TOTAL

REVISION

CEMENT

MORTALITY

LIST OF FIGURES

GOVERNMENT

HIP REPLACEMENT

GENERAL

PRIMARY PARTIAL

PRIMARY TOTAL

REVISION

KNEE REPLACEMENT

GENERAL

UNISPACER AND PATELLA/TROCHLEAR

UNICOMPARTMENTAL

PRIMARY TOTAL

REVISION

CEMENT

MORTALITY

APPENDICES

PARTICIPATING HOSPITALS & COORDINATORS – August 2007

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
Kylie Duncan, CN 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
Colleen Smith, NUM Theatre
Port Lincoln Hospital
Chris Weber, NUM Theatre
Port Pirie Hospital
Sue Wilkinson, NUM Theatre
Queen Elizabeth Hospital
Carol Saniotis, NUM Theatre
Repatriation General Hospital
Judy Jaeger, A/CN Theatre
Riverland Regional Hospital
Leanne Zerna, RN Theatre
Royal Adelaide Hospital
Lisa Lewington, CN Orthopaedic Theatre
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
Lisa Kowalik, A/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 Health Care Adelaide
Maria Young, CN Theatre
Calvary Wakefield Hospital
Evelyn Carroll, CN Orthopaedic Theatre

SOUTH AUSTRALIA continued

Private Hospitals

Flinders Private Hospital
Yvette Rogers, CN Theatre
Glenelg Community Hospital
Jan Lewanndowski, CN Orthopaedic Theatre
North Eastern Community Hospital
Anne Sciacca, RN Theatre
Parkwynd Private Hospital
Helen Madigan, CN Orthopaedic Theatre
Sportsmed SA
Sarah Gold, Medical Records
St Andrew's Private Hospital
Rob Davi, CN Orthopaedic Theatre
Stirling & District Hospital
Nick Clarke, CNC Theatre
The Memorial Hospital
Katrina Smith, Orthopaedic Liaison
Western Hospital
Margaret Witts, RN Theatre

AUSTRALIAN CAPITAL TERRITORY

Private Hospitals

Calvary John James Hospital
Phillippa Parkins, RN Orthopaedics
Helen Bustard, CNC Theatre
The National Capital Private Hospital
Theresa Moran, NUM Orthopaedic Theatre

Public Hospitals

The Canberra Hospital
Helen Boyd, CNS Orthopaedic Theatre
Mary Ann Brook, CNS Orthopaedic Theatre

Public & Private Hospitals

Calvary Health Care
Milton Jamieson, RN Theatre

NORTHERN TERRITORY

Public Hospitals

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

Private Hospitals

Darwin Private Hospital
Barbara Kulbac, RN Theatre

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
Geraldton Hospital
Vicki Richards, CN Theatre
Kalgoorlie Regional Hospital
Karen Whittaker, Clinical Manager Theatre
Kaleeya Hospital
Rene Van Rooyen, RN Orthopaedic Theatre
Osborne Park Hospital
Jenny Misiewicz, RN Theatre
Royal Perth Hospital, Shenton Park
Christopher Sheen, Orthopaedic Coordinator
Royal Perth Hospital, Wellington St
Carmel McCormack, NUM Theatre
Sir Charles Gairdner Hospital
Sandra Miller, Quality Improvement Coordinator

Private Hospitals

Waikiki Private Hospital
Gillian Payne, RN Theatre
Hollywood Private Hospital
Judith Corbett, RN Theatre
Joondalup Health Campus
Sue-Ann Hall, Health Record Officer
Mercy Hospital Mt Lawley
Ty Masi, Orthopaedic Technician
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
Samantha Hunter, Orthopaedic Coordinator
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 Tasmania St Luke's Campus
Kerri Foster, Patient Information Services
Toni Morice, Operating Theatre Clerk
Calvary Hospital
Jane Walker, CNS Orthopaedic Theatre
Hobart Private Hospital
Sarah Bird, Perioperative Services Manager
North-West Private Hospital
Linda Wynwood, Theatre Manager

QUEENSLAND

Public Hospitals

Bundaberg Base Hospital
David Levings, Acting NUM Theatre
Cairns Base Hospital
Debbie Norris, Department of Orthopaedics
Rebecca Rowley, Department of Orthopaedics
Gold Coast Hospital
Allan Davies, NUM Theatre
Hervey Bay Hospital
Shane King, Acting CN 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*
Jess Hadley, Acting NUM 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
Amanda Lostroh, RN Theatre
Simon Bowly, RN Theatre
Townsville Hospital
Sharon Cooke, RN Orthopaedic Theatre

QUEENSLAND continued

Private Hospitals

Allamanda Private Hospital
Maragaret Law, NUM theatre
Brisbane Private Hospital
Liz Drabble, Operational Manager
Cairns Private Hospital
Pat Warburton, RN Theatre
Wendy Gauld, 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
Gwenda Bischof, Manager Surgical Services
Mater Misericordiae Hospital Bundaberg
Monica Mooney, CN Orthopaedic Theatre
Mater Misericordiae Hospital Hyde Park
Joanne Humphreys, CN Orthopaedic Theatre
Mater Misericordiae Hospital Mackay
Paul Lanigan, CNC Theatre
Mater Misericordiae Hospital Rockhampton
Tim Harkin, RN Theatre
Mater Misericordiae Hospital Townsville
Regina Hansen, CN Theatre
Mater Misericordiae Private Hospital
Melissa Gordon, RN Theatre,
Mater Private Hospital Redland
Erina Harris, RN Theatre
Nambour Selangor Private Hospital
Yvonne Hemingway, RN Theatre
Noosa Hospital
Janet McMeekin, RN Theatre
North West Private Hospital
Lyndal Schnitzerling, Clinical Coordinator Theatre
Peninsula Private Hospital
Lesley Henderson, NUM Theatre
Pindara Private Hospital
Carli Nicolaow, CN Orthopaedic Theatre
Pioneer Valley Hospital
Pam Barrett, NUM Theatre
St Andrew's Private Hospital
Brenda Stephens, Theatre Reception
St Andrew's Hospital, Toowoomba
Norma Stanley, 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
Judy Aslette, 2IC Orthopaedics
The Sunshine Coast Private Hospital
Sheree Bailey RN Theatre,
Chantalle Harrison, RN Theatre
Wesley Hospital
Debra Tyszkiewicz, CNM Ward 1M

VICTORIA

Public Hospitals

Austin Health
Ross Kentish, ANUM Orthopaedic Theatre
Ballarat Health Services
Leena Stephens, NUM Theatre
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
Jenny Brereton, 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
Tersia Steyn, RN Theatre

Public Hospitals

Sandringham & District Memorial Hospital
Di David, Coordinator Orthopaedic Clinic
South West Healthcare Warrnambool Campus
Tony Kelly, NUM Theatre
St Vincent's Public Hospital
Glynda Bonollo, ANUM Orthopaedic Theatre
Stawell Regional Health
Chris Shorten, NUM Theatre
Sunshine Hospital
Joy Curley, RN Theatre
Swan Hill District Hospital
Helen Wilkins, CNC Theatre
The Alfred
Caroline McMurray, Coordinator, Ortho 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, ACN Theatre
West Wimmera Health Service
Christine Dufty, NUM Theatre
Western District Health Service
Elizabeth Munro, NUM Theatre
Western Hospital
Vicki Mahaljcek, RN Theatre
Sharon Dodgson, Secretary, Orthopaedic Dept
Williamstown Hospital
Maureen Clark, ACN Theatre
Wimmera Health Care Group
Maree Markby, NUM Theatre
Catherine Jensen, A/NUM Theatre

Private Hospitals

Beleura Private Hospital
Jean Leyland, RN Theatre
Bellbird Private Hospital
Vanessa Keane, Orthopaedic Case Manager
Cabrini Health, Malvern
Jenny Salmond, Hospital Project Officer
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
Vera Shaw, AUM 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 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
Mountain District Hospital
Rosslyn Martin, NUM Theatre
Northpark Private Hospital
Lisa Sulyok, NUM Theatre
Peninsula Private Hospital
Ruth Honan, ANUM Orthopaedic Theatre
Ringwood Private Hospital
Carol Burns, ANUM Theatre
Shepparton Private Hospital
Niki Miller, Acting CNS Orthopaedic Theatre
South Eastern Private Hospital
Maureen Nacey, 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
Leanne McPherson, NUM Theatre
Gill Wheaton, CNS 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
Julie Keyte, CNS Orthopaedic Theatre
The Avenue Hospital
Annellen Watson, RN Theatre
The Valley Private Hospital
Lyn Fagan, NUM Perioperative Services
Vaucluse Hospital
Lesley Gilbert, Perioperatve Services Manager
Vimy House Private Hospital
Joy Miller, ANUM Theatre
Wangarratta Private Hospital
Cathy Duncan, NUM Theatre
Warringal Hospital
Judy McIvor, RN Theatre
Waverly Private Hospital
Debra Pereira, ANUM Theatre
Western Private Hospital
Vicki Canning, NUM Theatre

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
Bathurst Base Hospital
Kylie Peers, NUM Theatre
Blacktown Hospital
Cathy Jiear, NUM Theatre
Sergio Jumanong, RN Theatre
Bowral and District Hospital
Barbara Walsh, NUM Theatre
Broken Hill Health Service
Sue Beahl, RN Theatre
Campbelltown Hospital
Amanda Young, Theatre Reception
Canterbury Hospital
Jenny Cubit, NUM Theatre
Coffs Harbour Health Campus
Eric Dorman, NUM Theatre
Concord Repatriation Hospital
Monique Prowse, NUM 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
Marta Daniel, NUM Theatre
Hornsby & Ku-Ring-Gai Hospital
Bessie Chu, CNS Theatre
Institute of Rheumatology and Orthopaedic Surgery
Alex Vesley, NUM Theatre
John Hunter Hospital
Felicia Bristow, Equipment Officer
Lismore Base Hospital
Glen Nettle RN, Orthopaedic Theatre
Liverpool Health Service
John Murphy, NUM Operating Theatre
Maitland Hospital
Karen Cheers, NUM Theatre
Manly District Hospital
Heather Liddle, NUM Theatre
Maryanne Howell, RN Theatre
Manning Region Referral Hospital
Graham Cooke, RN Theatre
Mona Vale Hospital
Estelle vont Takach, CN Orthopaedic Theatre
Mt Druitt Hospital
Glennis Elliot, SNM Theatre

NEW SOUTH WALES continued

Public Hospitals

Murwillumbah District Hospital
Lynne Penglase, NUM Theatre
Nepean Hospital
Jenny Smith, CNC Orthopaedic Ward
Alan Muir, Orthopaedic Loan Coordinator
Orange Health Service
Teresa Luczak, Senior Nurse Manager, Theatre
Port Macquarie Base Hospital
Pam Campbell, NUM Theatre
Joanne Wright, Theatre Clerk
Royal Newcastle Centre
Rosalee Baird, NUM Theatre
Royal North Shore Hospital
Eileen Cole, Dept of Orthopaedics
Royal Prince Alfred Hospital
Lisa Hatton, NUM Theatre
Ryde Hospital
Karen Jones, NUM Theatre
Shoalhaven Group Hospital
Miep Mulder, Senior Nurse Manager, Theatre
St George Hospital
Simon Cheng, CNS Orthopaedic Theatre
St Vincent's Public Hospital
Mary Theresa Butler, NUM Perioperative Services
Sutherland Hospital
Matthew Wood, RN Theatre
Sydney Hospital & Sydney Eye Hospital
Greg Burrow, Director of Orthopaedics
Tamworth Base Hospital
Kevin Attard, RN Theatre
The Prince of Wales Hospital
Phyllis Davis, NUM Theatre
The 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

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
Katie Callaghan CNS 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
Julie Mitchell, NUM Theatre
Dubbo Private Hospital
Gail Priest, NUM Theatre
Dudley Private Hospital
Cecelia O'Keefe NUM Operating Theatre
Louise Johnson, CNS 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
Nathan Foran, NUM Theatre
Maitland Private Hospital
Ms Leanne Beavis, NUM Theatre
Mayo Private Hospital
Ms Emma Clarke, NUM Theatre
Nepean Private Hospital
Jan Wernert, NUM Theatre
Newcastle Private Hospital
Daivd Billings, RN Theatre,
North Gosford Private Hospital
Claire Monger, RN Orthopaedic Theatre
North Shore Private Hospital
Eileen Cole, Department of Orthopaedics
Nowra Private Hospital
Linda Martin, NUM Theatre
Port Macquarie Private Hospital
Susie Storm, CNS Orthopaedic Theatre

NEW SOUTH WALES continued

Private Hospitals

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
Kirsten Blore, 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, NUM Orthopaedic Theatre
Sydney Private Hospital
Jeremy Moles, Orthopaedic Educator
Sydney Southwest Private Hospital
Angela Wilbow, CNC Orthopaedics
Tamara Private Hospital
Kris Wall, NUM Operating Theatre
The Hills Private Hospital
Julie Guthrie, Clinical Orthopaedic Coordinator
The Mater Hospital
Toni Cummins, CNS 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*
Blue Mountains District ANZAC Memorial Hospital	*NSW*
Calvary Health Care Tasmania St Vincent's Campus	*TAS*
Caboolture Private Hospital	*QLD*

EXECUTIVE SUMMARY

The intention of this summary is to highlight major findings of this report. The report has been presented in a similar manner to last year. Prior to its release members of the Australian Orthopaedic Association Arthroplasty Society were invited to attend a two day workshop to review, provide feedback, comment and assist in determining information that should be presented.

The major purpose of the report is to provide information on the outcome of joint replacement surgery in Australia. Many factors impact on the result. Each year the value of the information increases. This is a consequence of time and increasing number of procedures available for analysis. This year the Registry is able to provide at least five years of outcome data for most categories of joint replacement.

The number of hip and knee replacements undertaken each year continues to increase. Analysis of government data indicates that in the financial year 1st July 2005 to 30th June 2006 there was a 3.5% increase (0.9% hips and 5.9% knees) over the previous financial year. In addition, most procedures were undertaken in private hospitals (59.5%).

Many of the trends in prostheses use and outcome reported by the Registry last year are also apparent following analysis of the additional data available for this year's report.

The Registry has previously reported the changing use of partial hip replacement for the management of fractured neck of femur. Decreasing use of Austin Moore prostheses and increased use of unipolar modular prostheses has continued in 2006.

Three factors that significantly impact on the revision rates of partial hip replacement are the category of prosthesis used, age at time of surgery and the method of fixation.

Unipolar monoblock prostheses, particularly Austin Moore prostheses, have a significantly higher rate of revision than both unipolar modular and bipolar prostheses. Both unipolar monoblock and unipolar modular prostheses have significantly greater rates of revision when individuals are less than 75 years of age at the time of surgery compared to over 75 years. This age effect is not apparent for bipolar prostheses. The use of cement fixation in all categories of partial hip replacement significantly reduces the risk of revision irrespective of age.

The use of resurfacing hip replacement has declined for the first time during this year. The proportion of primary total hip replacements that were resurfacing procedures in 2006 was 8.2%, compared to 8.9% in 2005. Factors affecting the outcome of resurfacing procedures include the type of prosthesis used, gender and age. Women have a significantly higher rate of revision and the risk of revision increases with age. Men also have an age related risk of revision which becomes significantly higher after the age of 65 years.

The use of cementless conventional total hip replacement continues to increase and accounted for 60% of all conventional total hips in 2006. There are significant differences in outcome depending on the type of fixation and these appear to be age related. Cement and hybrid fixation have a significantly lower rate of revision when patients are aged 65 years or older compared to cementless. This difference increases with increasing age. Hybrid fixation has a significantly lower rate of revision than cementless fixation in the 55 to 64 year age group. There is no difference between cementless, cemented or hybrid fixation in the under 55 year age group.

Patella/trochlear knee replacement has a higher rate of revision compared to other types of knee replacement with the exception of unispacer procedures. The cumulative percent revised at four years is 13%.

Unicompartmental knee replacement has continued to decrease in use. It has a significantly higher revision rate than primary total knee replacement. Age at the time of surgery is the major factor affecting

the outcome of these procedures. The cumulative percent revised ranges from 5.6% at five years in the 75 years or older age group to 13.3% in the less than 55 years age group.

Revisions of unicompartmental primary knees have a high re-revision rate. This is particularly true if the initial revision after the primary unicompartmental procedure is a unicompartmental revision. The cumulative re-revision rate for a 'uni to uni' revision at four years is 28.9%. This means that 28.9% of primary uni knees that use uni prostheses in the first revision are revised again. In comparison, primary uni knees that are revised using primary total prostheses have a cumulative re-revision rate at four years of 11.2%.

Age is a major factor affecting the revision rate of primary total knee replacement. Individuals less than 55 years of age have a cumulative percent revision of 8% at five years. This rate declines with increasing age to 2.1% in the 75 years and older group. Men are revised more frequently. The revision rate of primary total knee replacement is also increased if mobile tibial inserts or posterior stabilized femoral components are used. Using a patellar prosthesis reduces the risk of revision.

As in previous years, 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 additional number of these compared to previous years.

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 332,700 hip and knee procedures undertaken in 271,188 patients with a procedure date on or before the 31st December 2006.

The Registry receives information from all hospitals (public and private) undertaking joint replacement. Currently this involves 289 Hospitals but 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 surgical 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 almost 7%. Government figures detailed in this Report indicate that 64,177 hip and knee replacements were performed during the financial year 2005-2006. 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 outcome of joint replacement surgery although excellent, is variable. There are many factors known to influence this; age, gender and diagnosis of patients, the type of 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 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. In Sweden 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 value of the Registry however will increase in the longer term.

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, Deputy Directors 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 & Analysis Centre, University of Adelaide, is contracted by the AOA to provide data management and analysis services for the Registry.

In 2006 the Registry also established a Registry Advisory Committee. Its purpose is to provide information and advice to the Registry working group. The Registry Advisory Committee is an external committee with representation from a variety of stakeholders including government, orthopaedic industry, health insurance industry and consumers. It was agreed that the committee be chaired by an independent orthopaedic surgeon. Meetings are to be held four times a year.

The members of the committee are Mr Graham Mercer (Chairman) Professor Stephen Graves (Director AOA NJRR), Ms Kerry Flanagen (Dept of Health and Ageing), Dr Michael Armitage (AHIA), Dr David Hale (PDC), Mr John Cooper (MIAA), and Dr Janey Wale (Consumer representative).

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. As yet no hospital has taken up this offer

DATA VALIDATION

The Registry validates data collected from hospitals by comparing it to data provided by state and territory health departments. Validation of Registry data is a sequential multi-level matching process against these health departments' unit record data. The validation process identifies:

- Registry procedure records for procedures notified to state/territory health departments by hospitals

- State/territory records for procedures not submitted to the Registry by hospitals
- 'Exact match' procedures, that is, records held by the Registry and state/territory health departments
- Procedures that match on some parameters, but which require additional checking with hospitals to enable verification.

The initial validation is performed using hospital and patient identity number with subsequent 'matching' undertaken on relevant procedure codes and appropriate admission time periods. Data errors can occur within Government or Registry data at any of these levels; that is, errors in patient identification, coding or admission period attribution by either the hospital, state health department or the Registry. Data mis-matches are managed depending on the nature of the error, for example a health department record for a primary 'knee' may match a Registry held record for a hip matching on all parameters except procedure type. The Registry would regard the Registry data to be correct in this instance as the Registry record contains details of the prostheses implanted. Other errors may be resolved by contacting the treating hospital for clarification of primary or revision codes or admission period.

Since the Registry's inception individual level patient/procedure validation has been performed on Registry data for public and private hospitals in South Australia, Western Australia, Tasmania, Victoria, The Australian Capital Territory and the Northern Territory (public hospital data only). New South Wales and Queensland supply aggregate data. Negotiations are ongoing with both states to obtain data at patient unit record level.

In the 2005/6 financial year period the Registry received notification of approximately 700 more procedures than were provided in the various health departments' unit record data. The Registry accepts that these additional notifications are valid.

Importantly the validation process identifies procedures that have not been submitted to the Registry. In the period 2005/6 the Registry has identified almost 400 procedures in health department files which were not submitted to the Registry (25% of these are procedures with an ICD10 code for hemiarthroplasty of the femur). Sufficient information is supplied in the state unit record data (patient unit record number, admission period and procedure type) to enable the Registry to request procedure details from individual hospitals for these 'missing' data.

For the 2005/6 Registry data, the initial validation resulted in over 96% of Registry records verified against health department data. Using the validation process and following retrieval of unreported records and checking of unmatched data, the Registry is able to obtain an almost complete set of data relating to hip and knee joint 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 & 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 other contributory factors. This algorithm will be subject to change as its performance is reviewed and further data are collected.

Survival Analysis

The Registry describes the time to revision of a prosthesis using the Kaplan-Meier estimates of survivorship (see Glossary, Appendix 1). The estimates are displayed on the graph until the point at which the proportion of prostheses that are at risk for revision is at least 10% of the initial number at risk for that category, unless this number is greater than 200, in which case we extend the graph to the nearest year. 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.

REPORT REVIEW PRIOR TO PUBLICATION

Prior to publication the report is provided to the Board of the AOA for consideration and approval. This year for the first time an additional review process was undertaken in which members of the Arthroplasty Society were invited to attend a two day workshop to review, comment and provide advice and feedback on the report.

This workshop was attended by 11 orthopaedic surgeons, two Registry staff and four DMAC staff. All sections of the report related to the analysis of Registry data were reviewed. The participants had the opportunity to request and view additional analyses. This report was the agreed report finalised at that meeting.

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.

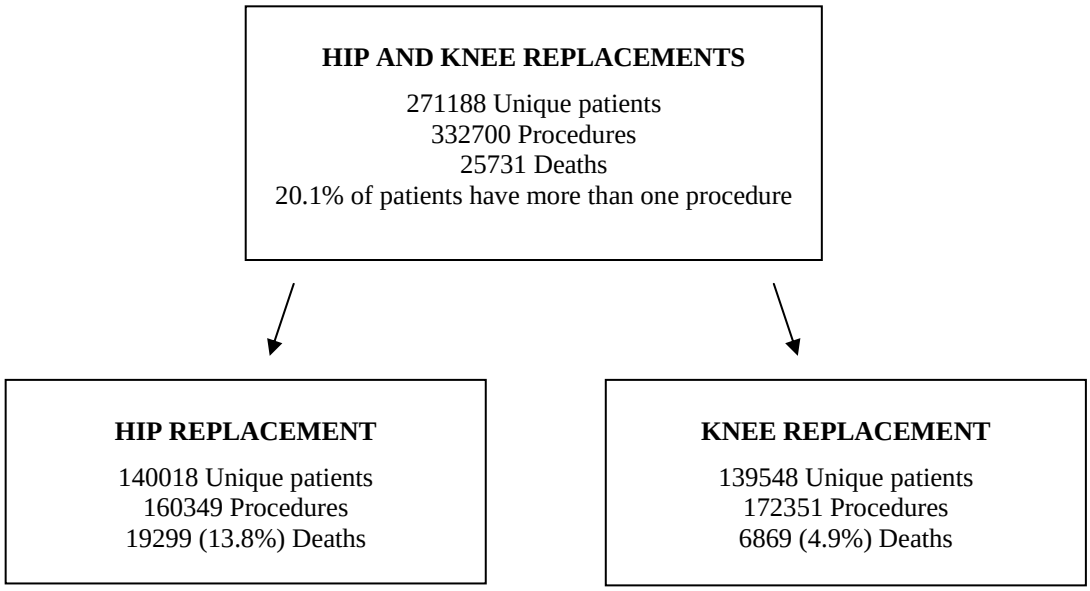
IMPLEMENTATION OF NATIONAL JOINT REPLACEMENT REGISTRY

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 was the first full year of complete national data.*

Chart of patients and procedures recorded by the Registry to December 2006



GOVERNMENT JOINT REPLACEMENT DATA 1994 - 1995 to 2005 – 2006

Introduction

The data presented in this section of the report have been obtained from each state and territory health department. These data provide information on the frequency of joint replacement for the financial year 1st July 2005 to 30th June 2006 as well as detailing changes over the twelve year period from the 1994-1995 financial year. These data do not provide any outcome information.

Both public and private hospital data were obtained for specific ICD-10-AM codes relating to hip and knee joint replacement. Data for each state are presented individually but because of small numbers the data for the Australian Capital Territory (ACT) and Northern Territory (NT) have been combined.

General Comments

Nationally the number of hip and knee replacement procedures increased by 3.5% to 64,177 during the 2005-2006 financial year compared to the 2004-2005 financial year (Table G1 & G2).

This increase was not uniform across the country. The states with the largest increase were Tasmania and New South Wales (7.2% and 6.7% respectively). The number of hip and knee replacements declined however in both South Australia (-2.4%) and Australian Capital Territory / Northern Territory (-2.9%) (Table G3 and Figure G1).

Hip and knee joint replacement surgery has increased by 100.5% over the last 12 years. Hip replacement has increased by 63.3% and knee replacement by 152.3% (Table G4 and Figure G2). Queensland has had the largest increase in hip replacement (99.0%) and Tasmania, the largest in knee replacement (180.7%) (Table G5).

Incidence

The combined hip and knee replacement incidence per 100,000 increased to 311.5 during 2005-2006. The incidence per 100,000 for different types of hip and knee replacement per state is shown in Table G6. Tasmania has the highest incidence of hip replacement 206.6 per 100,000 and South Australian the highest incidence of knee replacement 189.9 per 100,000.

The incidence per 100,000 of hip replacement has remained relatively constant over the last 3 years while the incidence of knee replacement has continued to increase (Table G7).

Knee replacement procedures (163.7 per 100,000 in 2005-2006) continue to have a higher incidence than hip replacement (147.7 per 100,000) (Table G6 and G7).

The hip replacement figure includes primary partial, primary total and revision hip replacement. The knee replacement figure includes primary patella/trochlear, unicompartmental and total as well as revision procedures. Primary partial hips are most often undertaken for neck of femur fracture. Primary total hip and all types of primary knee replacement are usually undertaken for arthritis and in particular osteoarthritis. Excluding primary partial hip and revision procedures from both hip and knee replacement allows a comparison of hip and knee procedures undertaken for degenerative joint disease. Primary total hip replacement has an incidence of 102.2 per 100,000. The incidence per 100,000 of all primary knee replacement procedures is 150.5 (Table G6).

Hip Replacement

The total number of hip replacements recorded by state and territory governments for 2005-2006 financial year was 30,440. This is an increase of 0.9% compared to the previous year (Table G2).

The use of the different types of hip replacement is presented in Table G1. During 2005-2006 there was a reduction in the number of partial (1.3%) and revision hips (0.5%) and an increase in the number of primary total hips (1.8%) (Table G2).
The proportion of hip revisions decreased from 12.6% to 12.4% (Tables G1, G2 and Figure G4). It is important to emphasize that the proportion of procedures that are revisions is not the revision rate but is the merely the proportion of hip replacement procedures that are revisions. It is not known nor possible to determine from the health department data which types of hip replacement (partial, primary or revision) have been revised.

Knee Replacement.

The total number of knee replacements recorded by state and territory governments for 2005-2006 financial year was 33,737. This is an increase of 5.9% compared to the previous year (Table G2).

The proportion of unicompartmental knee replacements (10.2%) was unchanged but the absolute number of procedures increased by 5.9%. The proportion of primary total knees increased marginally from 79.8% to 80.2%. The absolute numbers increased by 6.4%. The proportion of revision knee replacements declined from 8.6% to 8.1%, the absolute numbers decreased by 0.5% (Table G2).

South Australia continued to have the highest percentage of knee revisions (9.9%) (Table G1 and Figure G5).

Private and Public

In 2005-2006 there was a larger increase in hip and knee replacement in the public system (8.3% public and 0.4% private) (Table G8 and Figure G6).

This increase in the public compared to private system was greater in knee replacement (knees; 14.5% public, 1.6% private, hips; 3.4% public, -1.1% private) (Tables G 9 and G10 and Figures G6, G7 and G8).

Hip and knee procedures performed in both public and private for the individual state and territories for the financial years 1997-1998 to 2005-2006 are shown in Figures G9 to G15.

Hip and Knee Replacement

Table G1: Number (percent) of Hip & Knee Replacements Nationally 1/7/2005 - 30/6/2006

Type of joint replacement	*NSW*	*VIC*	*QLD*	*WA*	*SA*	*TAS*	*ACT/NT*	*Aust. total*
Hip replacement								
Partial	1,693	1,391	1,113	568	597	167	90	5,619
	17.8	*16.8*	*21.6*	*18.8*	*21.6*	*16.5*	*12.4*	*18.5*
Primary total	6,700	5,808	3,335	2,078	1,851	736	542	21,050
	70.5	*70.3*	*64.9*	*68.6*	*66.8*	*72.9*	*74.5*	*69.2*
Revision	1,107	1,063	694	383	321	107	96	3,771
	11.7	*12.9*	*13.5*	*12.6*	*11.6*	*10.6*	*13.2*	*12.4*
Total	**9,500**	**8,262**	**5,142**	**3,029**	**2,769**	**1,010**	**728**	**30,440**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Knee replacement								
Patellar/trochlear	237	99	102	24	38	2	6	508
	1.9	*1.4*	*1.7*	*0.8*	*1.3*	*0.2*	*0.7*	*1.5*
Unicompartmental	1,521	794	303	166	499	62	106	3,451
	12.1	*11.1*	*4.9*	*5.3*	*16.9*	*7.1*	*12.9*	*10.2*
Primary total	9,992	5,621	5,243	2,670	2,122	753	648	27,049
	79.3	*78.5*	*84.8*	*84.9*	*71.9*	*86.3*	*78.7*	*80.2*
Revision	858	643	532	284	293	56	63	2,729
	6.8	*9.0*	*8.6*	*9.0*	*9.9*	*6.4*	*7.7*	*8.1*
Total	**12,608**	**7,157**	**6,180**	**3,144**	**2,952**	**873**	**823**	**33,737**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Hip & KneeTotal	**22,108**	**15,419**	**11,322**	**6,173**	**5,721**	**1,883**	**1,551**	**64,177**

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

Table G2: Hip and Knee Joint Replacement Percentage Changes 1/7/2005 - 30/6/2006 Relative to 1/7/2004 - 30/6/2005

Type of joint replacement	*Aust. Total 1/7/'03-30/6/'04*	*Aust. Total 1/7/'04-30/6/'05*	*Aust. Total 1/7/'05-30/6/'06*	*Percentage change relative to 2004-2005*
Hip replacement				
Partial	5,878	5,692	5,619	-1.3
Primary total	19,380	20,683	21,050	1.8
Revision	3,907	3,791	3,771	-0.5
Total	**29,165**	**30,166**	**30,440**	**0.9**
Knee replacement				
Patellar/trochlear	299	439	508	15.7
Unicompartmental	3,525	3,259	3,451	5.9
Primary total	23,463	25,428	27,049	6.4
Revision	2,612	2,744	2,729	-0.5
Total	**29,899**	**31,870**	**33,737**	5.9
National Total	**59,064**	**62,036**	**64,177**	3.5

Table G3: State and Territories Number and Percentage Changes for Combined Hip and Knee Replacement 1/7/2005 - 30/6/2006 Relative to 1/7/2004 - 30/6/2005

States and Territories	*State Total 1/7/'03-30/6/'04*	*State Total 1/7/'04-30/6/'05*	*State Total 1/7/'05-30/6/'06*	*Percentage change relative to 2004 – 2005*
NSW	20,109	20,726	22,108	6.7
VIC	14,287	14,938	15,419	3.2
QLD	10,574	11,237	11,322	0.8
WA	5,682	5,923	6,173	4.2
SA	5,382	5,859	5,721	-2.4
TAS	1,465	1,756	1,883	7.2
ACT/NT	1,565	1,597	1,551	-2.9
National Total	**59,064**	**62,036**	**64,177**	**3.5**

Figure G1: State & Territories Total Joint Replacements 1/7/2004 - 30/6/2005 & 1/7/2005 - 30/6/2006

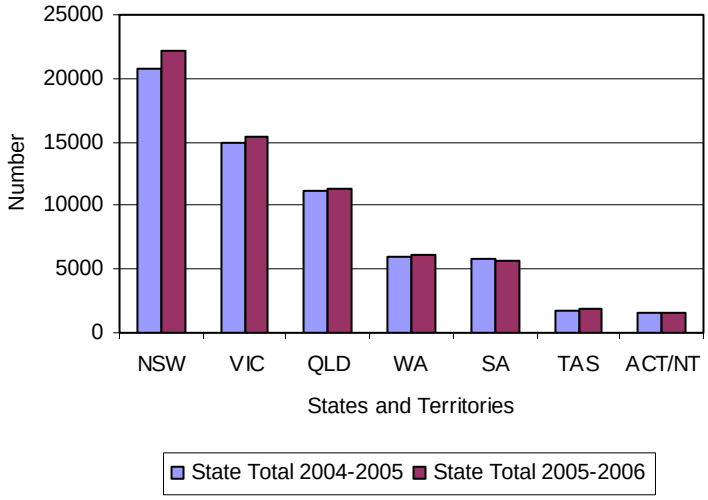


Table G4: Number of Hip and Knee Replacement Procedures from 1994 - 1995 to 2005 - 2006 with percentage change on previous year.

Year	*Hip replacement N*	*% change*	*Knee replacement N*	*% change*	*Total N*	*% 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
2005-2006	30,440	0.9	33,737	5.9	64,177	3.5
***1994/95-2005/06**		**63.3**		**152.3**		**100.5**

Note: *N/A indicates not applicable. Bilaterals are counted as two replacements from 2000-01.*
** % change for entire period 1994-1995 to 2005-2006 is relative to 1994-1995*

Figure G2: Number of hip and knee replacement procedures from 1994 - 1995 to 2005 - 2006

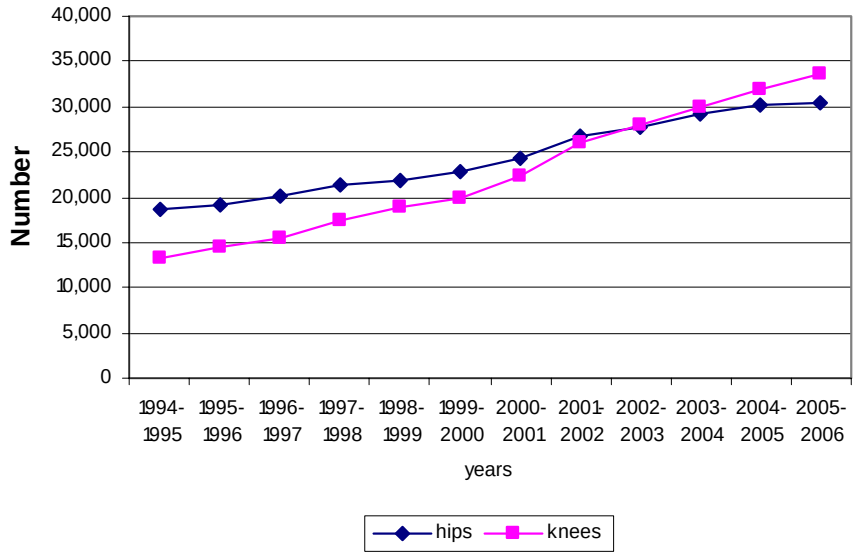


Table G5: Percentage change between 1994 - 1995 to 2005 – 2006 for both Hip and Knee Replacement Procedures, by State

Type of joint replacement	*NSW* %	*VIC* %	*QLD* %	*WA* %	*SA* %	*TAS* %	*ACT/NT* %	*Aust total* %
Hip replacement								
Primary Partial	17.7	8.6	73.9	34.9	15.5	45.2	52.5	25.7
Primary Total	72.8	85.5	115.2	103.5	57.7	73.6	123.0	84.3
Revision	22.7	43.6	76.1	47.3	-1.5	48.6	95.9	37.5
Total (all types) hips	**52.8**	**60.4**	**99.0**	**78.0**	**37.3**	**65.3**	**107.4**	**63.3**
Knee replacement								
Primary Total	117.6	121.5	142.3	135.9	84.5	154.4	310.1	124.8
Primary (all primaries)	155.9	156.7	161.0	152.7	131.2	176.0	381.0	381.0
Revision	69.9	134.7	127.4	107.3	117.0	273.3	53.7	103.5
Total (all types) knees	**147.4**	**154.5**	**157.7**	**147.8**	**129.7**	**180.7**	**313.6**	**152.3**
Total Hip & Knee	**95.4**	**93.6**	**127.3**	**107.8**	**73.3**	**104.2**	**182.0**	**100.5**

Note: *Patella/trochlear and Unicompartmental data are included in the 1994 to 1995 year in the primary knee numbers. Separate ICD 10 codes for Patella/trochlear and Unicompartmental were introduced in 1999-2000.*

For this analysis the 1994-1995 primary knee numbers includes Patella/trochlear and Unicompartmental. The Registry believes that the numbers of Patella/trochlear and Unicompartmental joint replacement undertaken in 1994-1995 would have been small.

The above table shows percentage changes between 1994-1995 primary knee (includes Patella/trochlear and Unicompartmental) and 2005 to 2006 Primary Total (excludes Patella/trochlear and Unicompartmental) and Primary ((all primaries) includes Patella/trochlear and Unicompartmental)

Incidence of Hip and Knee Replacement for 2005 - 2006

Table G6: Incidence of Hip and Knee Joint Replacement by State & Territory per 100,000 population for 2005 - 2006

Type of joint replacement	*NSW* **Pop.** *6827700*	*VIC* **Pop.** *5091700*	*QLD* **Pop.** *4053400*	*WA* **Pop.** *2050900*	*SA* **Pop.** *1554700*	*TAS* **Pop.** *488900*	*ACT/NT* **Pop** ***535500***	*AUST.* *Pop.* *20605500*
Hip replacement								
Partial	24.8	27.3	27.5	27.7	38.4	34.2	16.8	27.3
Primary total	98.1	114.1	82.3	101.3	119.1	150.5	101.2	102.2
Revision	16.2	20.9	17.1	18.7	20.6	21.9	17.9	18.3
Total	**139.1**	**162.3**	**126.9**	**147.7**	**178.1**	**206.6**	**135.9**	**147.7**
Knee replacement								
Patellar/trochlear	3.5	1.9	2.5	1.2	2.4	0.4	1.1	2.5
Unicompartmental	22.3	15.6	7.5	8.1	32.1	12.7	19.8	16.7
Primary total	146.3	110.4	129.3	130.2	136.5	154.0	121.0	131.3
Revision	12.6	12.6	13.1	13.8	18.8	11.5	11.8	13.2
Total	**184.7**	**140.6**	**152.5**	**153.3**	**189.9**	**178.6**	**153.7**	**163.7**
State total	**323.8**	**302.8**	**279.3**	**301.0**	**368.0**	**385.2**	**289.6**	**311.5**

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, Jun 2006
Released at 11:30 AM (CANBERRA TIME) 07/12/2006
JUNE QTR KEY FIGURES, Preliminary Data
www.abs.gov.au/Ausstats/abs@.nfs

Figure G3: Incidence of Joint Replacement by State & Territories 2005 - 2006

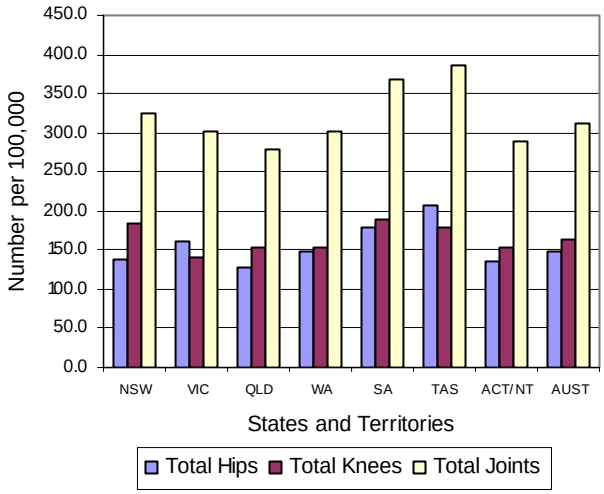


Table G7: Incidence of Different Hip and Knee Joint Replacement Procedures per 100,000 population for Australia from 1997 - 1998 to 2005 - 2006

Type of joint replacement	**1997 - 1998**	**1998 - 1999**	**1999 - 2000**	**2000 - 2001**	**2001 - 2002**	**2002 - 2003**	**2003 - 2004**	**2004 - 2005**	**2005 - 2006**
population as at June 30th	*18711300*	*18925900*	*19153400*	*19413200*	*19641000*	*19881500*	*20111300*	*20328600*	*20605500*
Hip replacement									
Partial	26.4	26.8	27.6	28.2	28.5	28.5	29.2	28.0	27.3
Primary total	72.4	73.2	74.1	79.2	88.5	93.2	96.4	101.7	102.2
Revision	15.5	15.2	16.9	17.7	18.9	18.3	19.4	18.6	18.3
Total hips	**114.3**	**115.2**	**118.6**	**125.1**	**135.9**	**140.0**	**145.0**	**148.4**	**147.7**
Knee replacement									
Patellar/trochlear	N/A	N/A	0.9	1.1	1.3	1.5	1.5	2.2	2.5
Unicompartmental	N/A	N/A	11.3	14.4	16.5	17.9	17.5	16.0	16.7
Primary total	83.4	90.3	81.4	88.2	103.3	108.3	116.7	125.1	131.3
Revision	9.2	9.2	10.4	10.9	11.7	13.1	13.0	13.5	13.2
Total knees	**92.5**	**99.5**	**104.1**	**114.6**	**132.8**	**140.8**	**148.7**	**156.8**	**163.7**
Total	**206.8**	**214.7**	**222.7**	**239.7**	**268.7**	**280.8**	**293.7**	**305.2**	**311.5**

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, Jun 2006
Released at 11:30 AM (CANBERRA TIME) 07/12/2006
JUNE QTR KEY FIGURES, Preliminary Data
www.abs.gov.au/Ausstats/abs@.nfs

Revision Surgery for 2005 - 2006

Figure G4: Percentage of Revision Hip Replacement 2005 - 2006

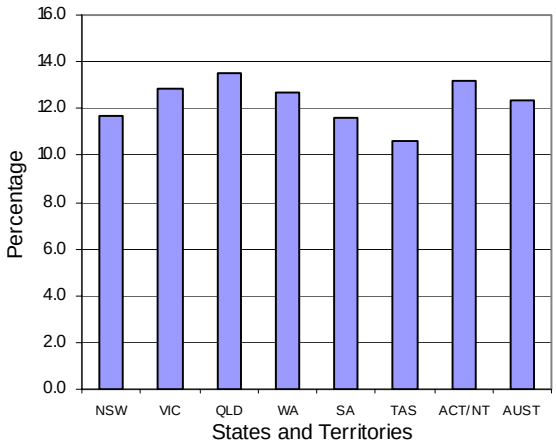


Figure G4 represents, within each state, the percentage of hip surgery that was revision surgery for 2005 - 2006. It is not possible to determine which type (partial, primary or revision) of hip replacement had been revised.

Figure G5: Percentage of Revision Knee Replacement 2005 - 2006

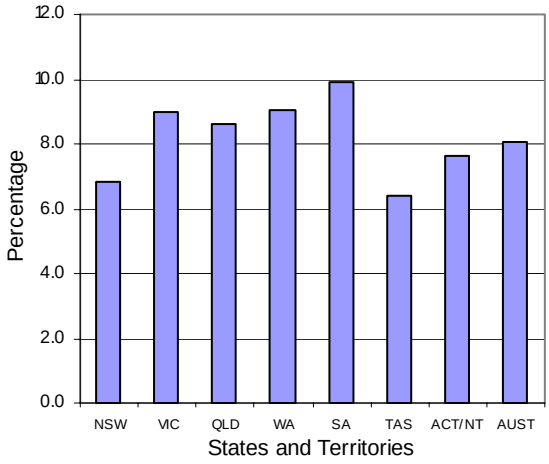


Figure G5 represents, within each state, the percentage of knee surgery that was revision surgery for 2005 - 2006. Primary total or uni as well as revision knee replacements may have been revised.

Public and Private 1997 - 1998 to 2005 - 2006

Table G8: Public & Private Percentage Changes relative to previous year per year for Hip and Knee Replacement for the last 9 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%)***
2005-2006	26,015 **(8.3%)**	38,162 **(0.4%)**	64,177 **(3.5%)**

Figure G6: Number of Hip and Knee Joint Replacements at Public & Private Hospitals 1/7/2005 - 30/6/2006

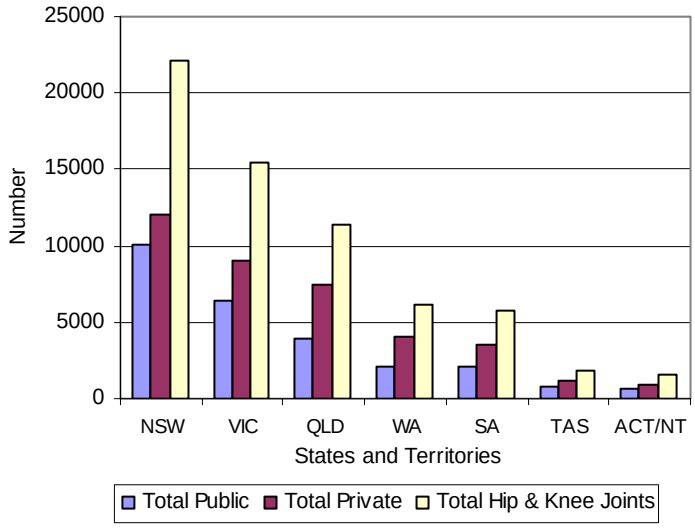


Table G9: Public & Private Percentage Changes for Hip Replacement per year for the last 9 years 1st July – 30th June

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%)***
2005-2006	13,909 ***(3.4%)***	16,531***(-1.1%)***	30,440 ***(0.9%)***

Figure G7: Number of Hip Joint Replacements at Public & Private Hospitals 1997 - 1998 to 2005 - 2006

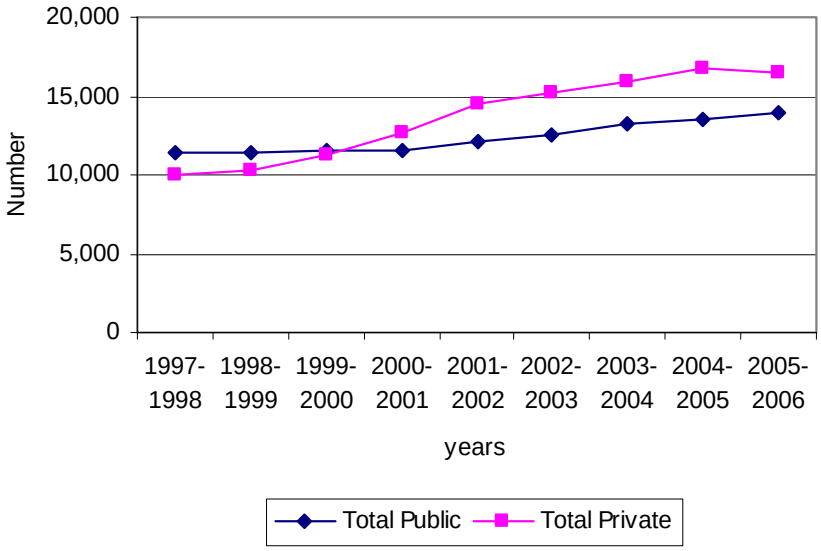


Table G10: Public & Private Percentage Changes for Knee Replacement per year for the last 9 years 1st July - 30th June

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%)***
2005-2006	12,106 ***(14.5%)***	21,631 ***(1.6%)***	33,737***(5.9%)***

Figure G8: Number of Knee Joint Replacement at Public & Private Hospitals 1997 - 1998 to 2005 - 2006

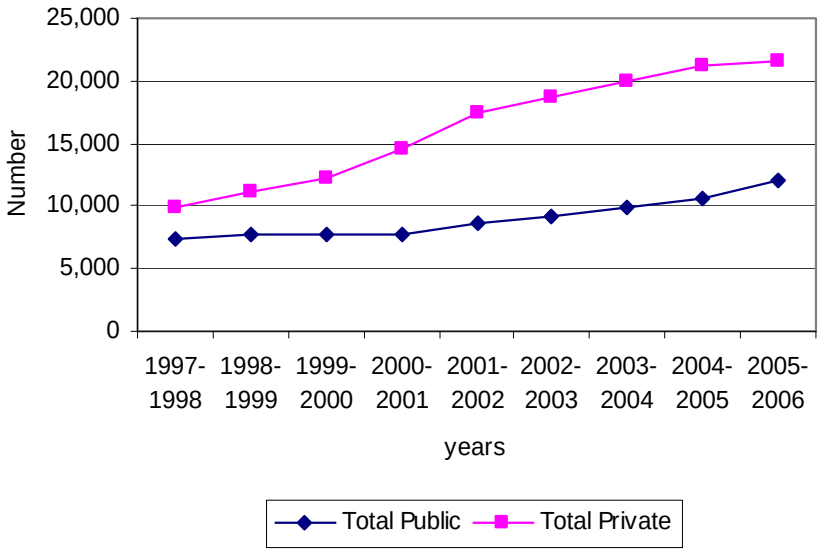


Figure G9: New South Wales - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06

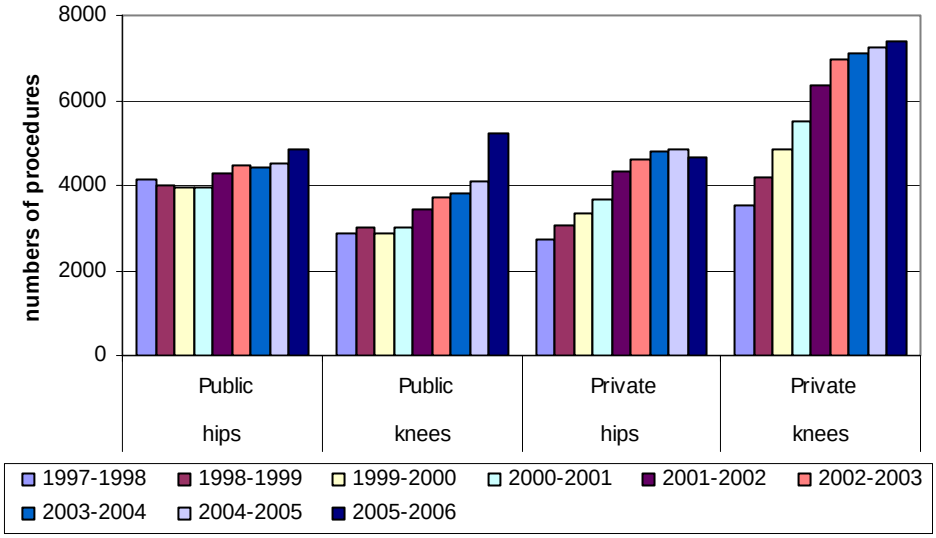


Figure G10: Victoria - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06

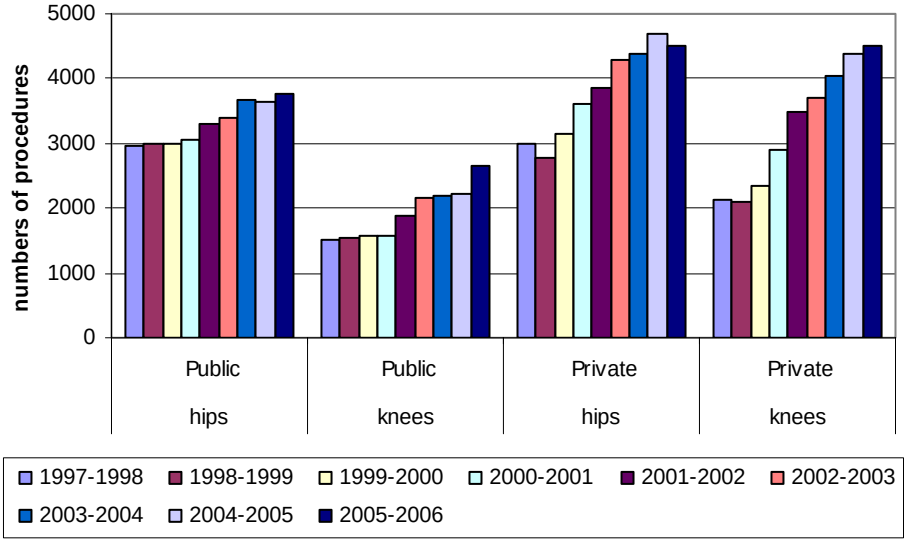


Figure G11: Queensland - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06

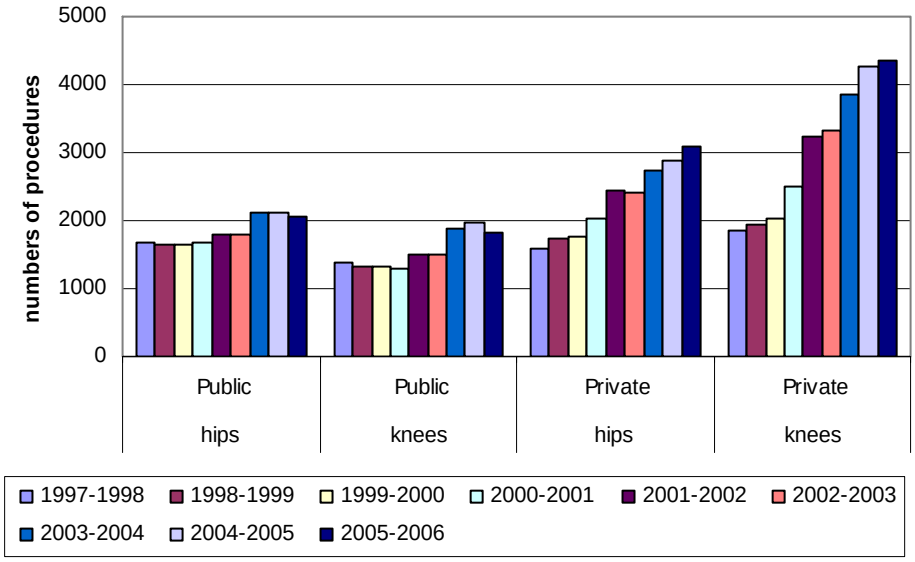


Figure G12: Western Australia - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06

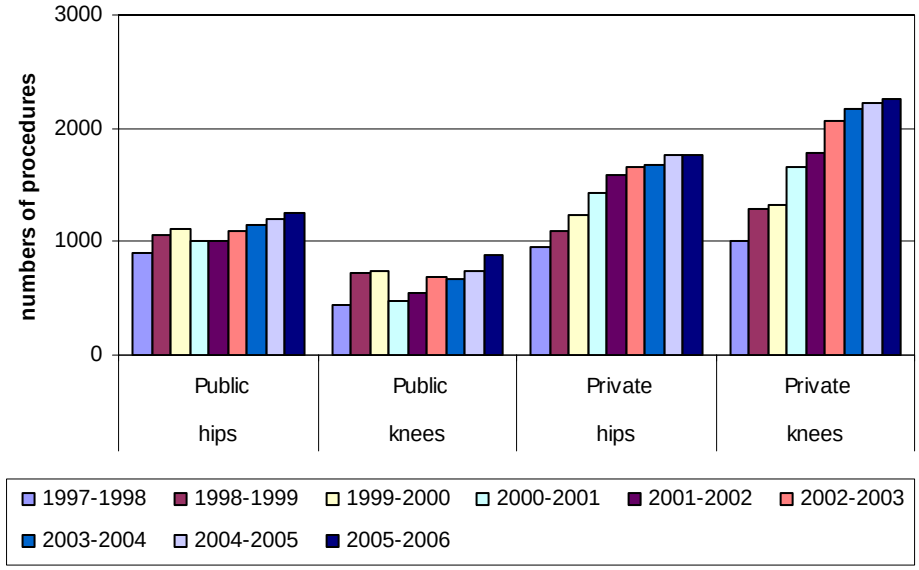


Figure G13: South Australia - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06

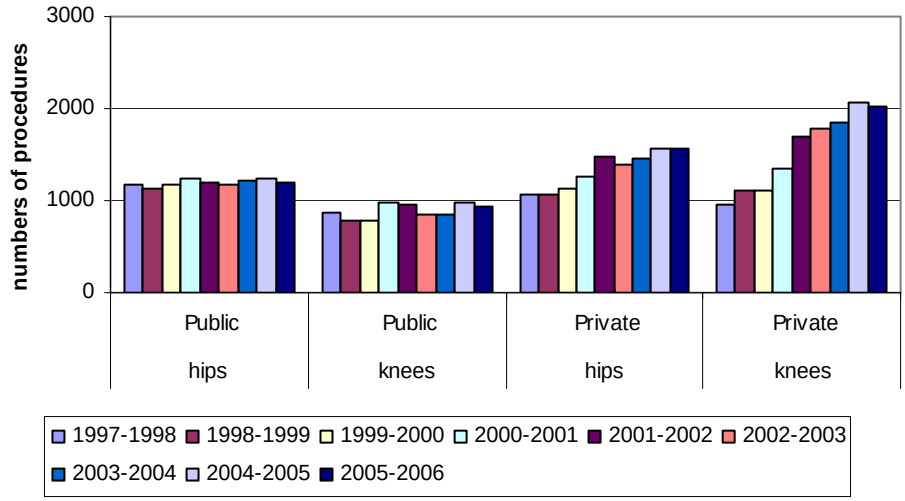


Figure G14: Tasmania - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06

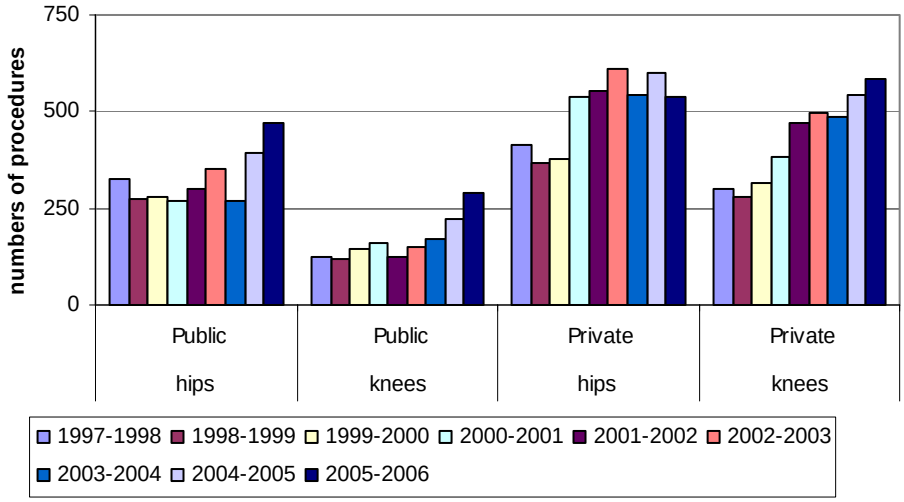
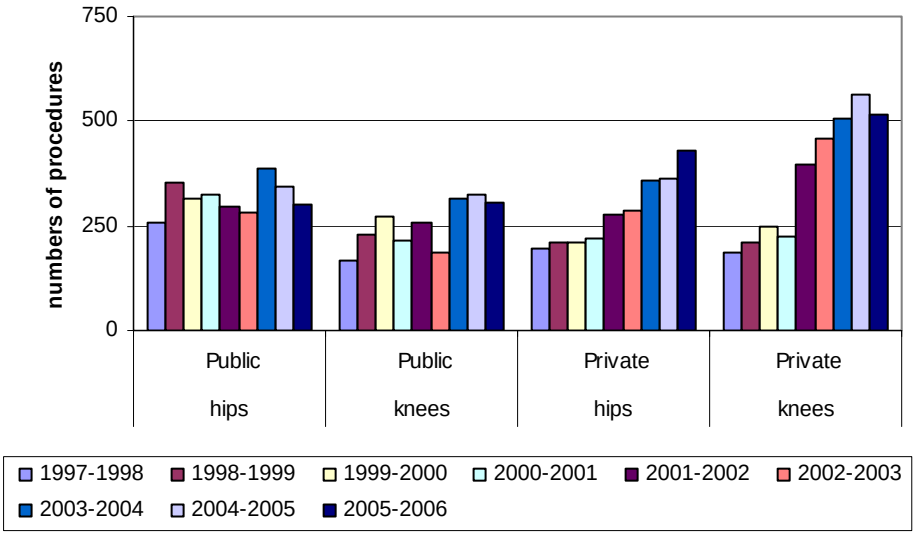


Figure G15: Australian Capital Territory/Northern Territory - Number of Hip and Knee Procedures in Public and Private Hospitals 1997 - 98 to 2005 - 06



AOA National Joint Replacement Registry
Hip Replacement Data

General Introduction

This report is based on the analysis of 160,340 primary and revision hip procedures received by the Registry with a procedure date prior to the end of 2006. This is an additional 29,359 hip procedures compared to the 2006 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 arthroplasty 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. Re-operations that do not involve removal, replacement or addition of another prosthesis are not regarded as a revision procedure and are therefore not included in the revision analysis.

Gender

Hip replacement procedures are performed more frequently in females (57%) than men. There are gender variations depending on the category of hip replacement. Primary partial hips (74.3%) and primary total hips (53.3%) are undertaken more frequently in women. Resurfacing and thrust plate procedures are undertaken more frequently in men (71.6%, 69.6% respectively). More women have revision procedures (54.5%) (Table HG1). It is important to remember however that revisions include revisions of all categories of primary hip replacement as well as subsequently revised revision procedures.

The proportion of women receiving primary partial or primary conventional total hips each year has remained relatively constant over the last five years. The slight reduction in women receiving resurfacing procedures reported last year has continued in 2006 (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 81.6 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 56.3 years and conventional 68.1 years) (refer 2007 Supplementary Report www.aoa.org.au). These figures are unchanged from those in last year's supplementary report with the exception of a slight increase in mean age for thrust plate procedures.

The mean age for revision procedures is 70.8 years (71.4 years females and 70.0 years males) (refer 2007 Supplementary Report www.aoa.org.au). Again these figures are unchanged from last year's supplementary report.

Primary partial hip is rarely undertaken on individuals less than 65 years of age (4.3%). Procedures are undertaken more

frequently in this age group in other categories of hip replacement, accounting for 34.0% of conventional hips, 80.1% of thrust plate and 89.9% of resurfacing procedures. Over a quarter of revision procedures are undertaken on individuals less than 65 years of age (26.5%) (Table HG2).

There has been no change in the proportion of younger individuals (less than 65 years) receiving the different categories of primary hip replacement during the last five years (Figure HG2).

Diagnosis

The indication for almost all primary partial hips is fractured neck of femur (94.3%). Osteoarthritis is the major reason for most primary conventional total hip replacements (88.3%) and resurfacing procedures (93.7%) (data not shown but is available with a full list of diagnoses in the 2007 Supplementary Report www.aoa.org.au)

The principal cause for revision hip surgery is aseptic loosening (46.8%) (data not shown but available with a full list of diagnoses in the 2007 Supplementary Report www.aoa.org.au).

There are 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 (70.7% of all hip replacement procedures). Primary partial hips account for 16.8% and revisions 12.6% of all hip procedures (Table HG1).

During the last five years the proportion of primary total hip replacements has increased from 70.3% (2002) to 72.0% (2006). The proportion of primary partial hips has remained constant and revision procedures have decreased from 12.8% (2002) to 11.8% (2006). 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 replacement procedures. This proportion is affected by the number of other types of hip replacements undertaken.

State and Territory Variation in Use

There is state-by-state variation in most categories of hip procedures. In 2006 South Australia had the highest proportion of partial hips (19.5%) and ACT/NT the lowest (11.3%). In 2006 the ACT/NT had the highest proportion of primary total hip replacement (75.0% of all hip procedures) and Queensland the lowest (69.7%) (Figure HG3). The proportion of revision procedures also varies with the ACT/NT having the highest proportion (13.6%) and South Australia the lowest (10.6%) (Figure HG3).

Bilateral Primary Hip Procedures

For the purpose of this report bilateral primary procedures are defined as 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.

The Registry has information on 127,663 individuals who have had a primary hip procedure. Almost 10% (12,527) have had another primary hip procedure recorded by the Registry at some time subsequent to the initial primary procedure. The number of individuals who have been recorded by the Registry as having bilateral primary hip replacements has increased by 3,081 during 2006.

The most frequent bilateral primary hip replacement is bilateral primary conventional total hip (83.4% of all bilateral procedures) followed by bilateral primary resurfacing hip replacement (8.0%).

Of all individuals who have undergone bilateral primary hip replacements, 3.9% have had bilateral conventional total hip

procedures on the same day, and 1.6% have undergone bilateral resurfacing hip procedures on the same day. Of all individuals who have undergone bilateral conventional total hip procedures 4.7% were on the same day. Of all individuals who have undergone bilateral resurfacing hip procedures 19.7% were on the same day (Table HG3).

General Comparison of Outcomes

When considering the percentage of procedures that have been revised for each category of primary hip replacement, conventional total hip is the least revised primary hip procedure (conventional 2.3%, resurfacing 2.8% and primary partial 2.9%). This difference is also evident when comparing revisions per 100 observed component years (conventional 0.9, resurfacing 1.1 and primary partial 1.6) (Table HG4).

Comparison of the cumulative percent revised further highlights the difference in the risk of revision for each of these procedures. At five years the cumulative percentage revision for all diagnoses of primary conventional hip replacement is 3.4%, for resurfacing is 4.4% and primary partial hip is 5.2% (Table HG5).

Hip Replacement - 1/9/1999 to 31/12/2006

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	10868	74.6	3703	25.4	14571	54.2
Unipolar Modular	3806	74.3	1314	25.7	5120	19.1
Bipolar	5287	73.7	1885	26.3	7172	26.7
Primary Partial	19961	74.3	6902	25.7	26863	100.0
Conventional Total	57818	55.5	46416	44.5	104234	92.0
Resurfacing	2537	28.4	6408	71.6	8945	7.9
Thrust Plate	45	30.4	103	69.6	148	0.1
Primary Total	60400	53.3	52927	46.7	113327	100.0
Revision	10987	54.5	9163	45.5	20150	100.0
Total	**91348**	**57.0**	**68992**	**43.0**	**160340**	**100.0**

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

Figure HG1: Percentage (Female) for Partial, Conventional Total and Resurfacing Hip Replacement by Year

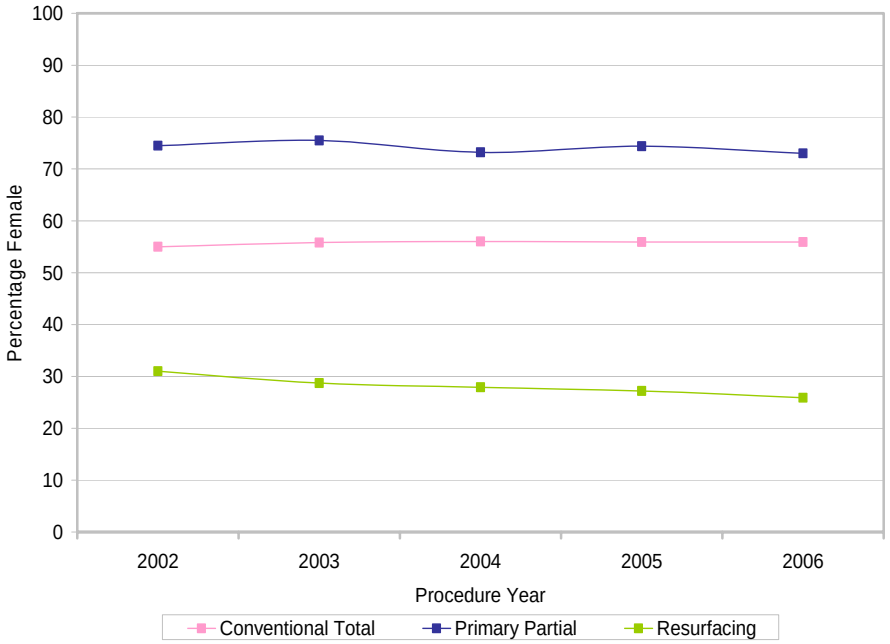


Table HG2: Summary statistics for All Hip Replacements by Age

Type of hip replacement	*<=54*		*55-64*		*65-74*		*75-84*		*>=85*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Unipolar Monoblock	33	0.2	177	1.2	1174	8.1	6060	41.6	7127	48.9	14571	54.2
Unipolar Modular	86	1.7	244	4.8	883	17.2	2274	44.4	1633	31.9	5120	19.1
Bipolar	184	2.6	445	6.2	1296	18.1	3238	45.1	2009	28.0	7172	26.7
Primary Partial	303	1.1	866	3.2	3353	12.5	11572	43.1	10769	40.1	26863	100.0
Conventional Total	12316	11.8	23184	22.2	35694	34.2	28011	26.9	5029	4.8	104234	92.0
Resurfacing	4593	51.3	3456	38.6	844	9.4	52	0.6	.	.	8945	7.9
Thrust Plate	58	39.2	62	41.9	26	17.6	2	1.4	.	.	148	0.1
Primary Total	16967	15.0	26702	23.6	36564	32.3	28065	24.8	5029	4.4	113327	100.0
Revision	2061	10.2	3279	16.3	6077	30.2	6758	33.5	1975	9.8	20150	100.0
Total	**19331**	**12.1**	**30847**	**19.2**	**45994**	**28.7**	**46395**	**28.9**	**17773**	**11.1**	**160340**	**100.0**

Figure HG2: Percentage (Age <65 years) for Partial, Conventional Total and Resurfacing Hip Replacement by Year

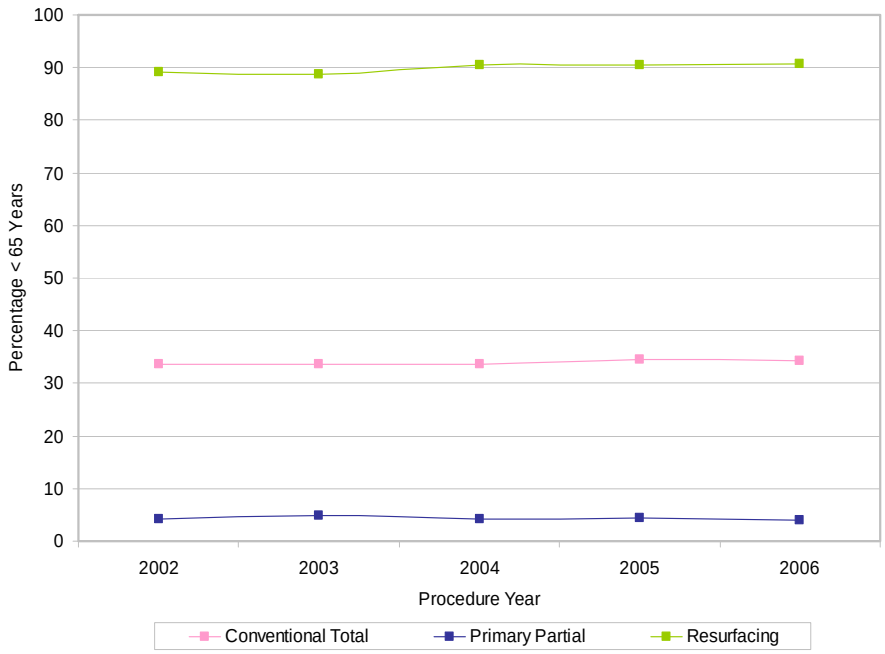


Figure HG3: Trends in Usage of Type of Hip Replacement by State and Territory

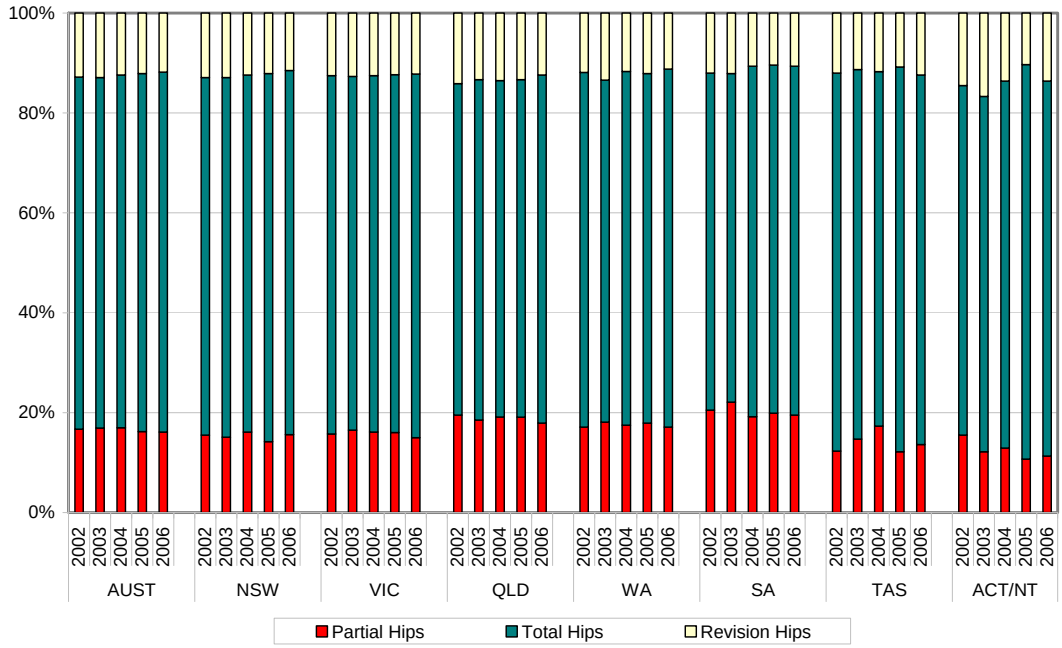


Table HG3: Time between procedures for Bilateral Primary Hips

1st Procedure	*2nd Procedure*	*Days between Bilateral Procedures*										***Total***	
		Same Day		*<6 weeks*		*6 weeks - 6 months*		*6 months - 3 years*		*>=3 years*			
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Bipolar	Bipolar	1	0.0	14	0.1	22	0.2	61	0.5	12	0.1	110	0.9
	Unipolar Mono	.	.	2	0.0	11	0.1	25	0.2	9	0.1	47	0.4
	Unipolar Modular	.	.	2	0.0	3	0.0	18	0.1	7	0.1	30	0.2
	Total Hip	1	0.0	1	0.0	7	0.1	25	0.2	9	0.1	43	0.3
Unipolar Mono	Bipolar	.	.	1	0.0	5	0.0	15	0.1	4	0.0	25	0.2
	Unipolar Mono	7	0.1	27	0.2	86	0.7	156	1.2	29	0.2	305	2.4
	Unipolar Modular	.	.	2	0.0	11	0.1	20	0.2	7	0.1	40	0.3
	Total Hip	.	.	.	.	6	0.0	8	0.1	4	0.0	18	0.1
Unipolar Modular	Bipolar	.	.	.	.	6	0.0	5	0.0	1	0.0	12	0.1
	Unipolar Mono	.	.	3	0.0	6	0.0	21	0.2	1	0.0	31	0.2
	Unipolar Modular	9	0.1	8	0.1	26	0.2	35	0.3	8	0.1	86	0.7
	Total Hip	.	.	.	.	4	0.0	11	0.1	.	.	15	0.1
Resurfacing	Unipolar Modular	.	.	.	.	.	.	2	0.0	.	.	2	0.0
	Resurfacing	198	1.6	37	0.3	202	1.6	476	3.8	94	0.8	1007	8.0
	Total Hip	2	0.0	.	.	8	0.1	54	0.4	30	0.2	94	0.8
Thrust Plate	Thrust Plate	1	0.0	.	.	6	0.0	11	0.1	4	0.0	22	0.2
	Total Hip	.	.	.	.	.	.	1	0.0	2	0.0	3	0.0
Total Hip	Bipolar	1	0.0	2	0.0	8	0.1	32	0.3	12	0.1	55	0.4
	Unipolar Mono	.	.	1	0.0	3	0.0	17	0.1	10	0.1	31	0.2
	Unipolar Modular	.	.	.	.	3	0.0	18	0.1	13	0.1	34	0.3
	Resurfacing	3	0.0	1	0.0	6	0.0	43	0.3	21	0.2	74	0.6
	Thrust Plate	.	.	.	.	.	.	1	0.0	.	.	1	0.0
	Total Hip	486	3.9	191	1.5	2689	21.5	5793	46.2	1283	10.2	10442	83.4
Total		**709**	**5.7**	**292**	**2.3**	**3118**	**24.9**	**6848**	**54.7**	**1560**	**12.5**	**12527**	**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	786	26863	2.9	49761	1.6	(1.47, 1.69)
Unipolar Monoblock	499	14571	3.4	26016	1.9	(1.75, 2.09)
Unipolar Modular	104	5120	2.0	8223	1.3	(1.03, 1.53)
Bipolar	183	7172	2.6	15522	1.2	(1.01, 1.36)
Conventional Total Hip	2441	104234	2.3	282999	0.9	(0.83, 0.90)
Cemented Total	308	14266	2.2	44503	0.7	(0.62, 0.77)
Cementless Total	1350	54418	2.5	138670	1.0	(0.92, 1.03)
Hybrid	783	35550	2.2	99826	0.8	(0.73, 0.84)
Resurfacing Hip	249	8945	2.8	22964	1.1	(0.95, 1.23)
Thrust Plates	4	148	2.7	516	0.8	(0.21, 1.99)
Total	**3480**	**140190**	**2.5**	**356240**	**1.0**	**(0.94, 1.01)**

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*	*5 years*
Partial Hip	2.5 (2.3, 2.7)	3.5 (3.3, 3.8)	4.2 (3.9, 4.5)	4.7 (4.3, 5.1)	5.2 (4.8, 5.7)
Unipolar Monoblock	3.0 (2.7, 3.3)	4.3 (3.9, 4.7)	5.1 (4.6, 5.6)	5.6 (5.1, 6.2)	6.3 (5.6, 7.0)
Unipolar Modular	1.7 (1.3, 2.1)	2.7 (2.1, 3.3)	3.2 (2.6, 4.1)	4.0 (3.1, 5.1)	
Bipolar	2.1 (1.7, 2.5)	2.8 (2.4, 3.3)	3.2 (2.8, 3.8)	3.6 (3.1, 4.2)	4.0 (3.3, 4.8)
Conventional Total	1.5 (1.4, 1.6)	2.1 (2.0, 2.2)	2.6 (2.5, 2.7)	2.9 (2.8, 3.1)	3.4 (3.3, 3.6)
Cemented Total	1.1 (1.0, 1.3)	1.7 (1.5, 1.9)	2.1 (1.9, 2.4)	2.5 (2.2, 2.8)	3.1 (2.7, 3.5)
Cementless Total	1.7 (1.6, 1.8)	2.3 (2.2, 2.4)	2.8 (2.6, 3.0)	3.2 (3.0, 3.3)	3.7 (3.5, 4.0)
Hybrid	1.4 (1.3, 1.5)	2.0 (1.8, 2.1)	2.4 (2.2, 2.6)	2.7 (2.5, 3.0)	3.1 (2.9, 3.4)
Resurfacing Hip	2.0 (1.7, 2.3)	2.6 (2.2, 2.9)	3.1 (2.7, 3.5)	3.6 (3.1, 4.1)	4.4 (3.7, 5.1)
Thrust Plates	1.4 (0.3, 5.4)	1.4 (0.3, 5.4)	2.3 (0.7, 7.0)	3.6 (1.3, 9.5)	3.6 (1.3, 9.5)

Primary Partial Hip Replacement

This report is based on the analysis of 26,863 primary partial hip replacement procedures recorded by the Registry with a procedure date prior to the end of 2006. In this category of hip replacement there are 14,571 unipolar monoblock, 5,120 unipolar modular and 7,172 bipolar procedures.

Usage

Almost all primary partial hip prostheses are used for the management of fractures of the neck of femur (94.3%). The proportion of primary partial hip replacements compared to total and revision hip procedures has remained constant over the last five years. In 2006 primary partial hips accounted for 16.8% of all hip procedures (Figure HG3).

As reported last year, there continues to be a change in the use of the different sub-categories of partial hip replacement.

Unipolar modular prostheses have increased in usage from 24.4% in 2005 to 35.0% in 2006. Although unipolar monoblock prostheses remain the most common group of partial hip replacements, their proportional use has continued to decline. Over the last twelve months this has decreased from 48.4% to 41.1%. There has also been a decrease in the proportional use of bipolar prostheses from a high of 29.9% in 2002 to 23.9% in 2006. (Figure HP1).

The proportional use of these different sub-categories of partial hip replacement varies considerably between the different states and territories. Unipolar modular prostheses are now the most common partial hip replacement in three states (Western Australia, Southern Australia and Tasmania). All states and territories demonstrate reducing use of both unipolar monoblock and bipolar prostheses. Bipolar prostheses however remain the most common partial hip replacement used in ACT/NT (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 unipolar monoblock prostheses is largely the result of reducing use of the Austin Moore prosthesis. Although this prosthesis remains the most commonly used prosthesis in the unipolar monoblock category its proportional use has continually declined from 81.5% in 2002 to 60.8% in 2006. In terms of absolute numbers the Austin Moore prosthesis has declined from a peak annual use of 1,985 in 2003 to 1,175 in 2006; a reduction of over 40% in three years.

The proportional use of the Thompson prosthesis has increased from 18.5% in 2002 to 29.2% in 2006. The absolute numbers of the Thompson prosthesis used however has declined slightly from a peak of 627 in 2004 to 564 in 2006. This is a 10% reduction in two years.

The ETS prosthesis was first used in Australia in 2004. Its use has gradually increased and during 2006 it accounted for 10% of all unipolar monoblock prostheses used (Table HP1 and Figure HP2).

Unipolar modular

In 2006, 17 different types of unipolar modular heads were used. This is an increase of three compared to 2005. These 17 heads have been combined with different stems to give 78 unique combinations of head and stem.

The Unitrax remains the most frequently used unipolar head and accounts for 29.7% of all heads used in this procedure. In 2006 the five most common unipolar heads were used in 82.7% of all cases, the next five 15.0% and the remaining seven were used in only 2.3% of cases (Table HP2 and Figure HP3).

Bipolar
Eighteen different bipolar heads were used during 2006. The UHR bipolar head was the most frequently used (47.5%).

The five most common bipolar heads were used in 85.7% of all bipolar procedures, the next five in 11.8% and the remaining eight in 2.6%.

As with unipolar modular heads, bipolar prostheses were combined with a large number of different femoral stems. The Registry now has information on 164 different combinations of bipolar head and femoral stem.

Changes in use with Gender and Age

Women are more likely to undergo a partial hip replacement than men (74.3%), however the rate of increase in use of partial hip replacement is greater in men than women. During the last five years the use of partial hip replacement in primary procedures has increased by 15.1%. During this period, use of partial hips in women has increased by 12.7% and men by 22.1%. As a consequence the ratio of women to men receiving partial hip replacement has declined slightly, this is due to unipolar monoblock prostheses where the ratio has dropped from 3.1:1 to 2.5:1 (Table HP4, HP5, HP6 and HP7).

Most patients undergoing partial hip replacement are 75 years of age or older. In 2006, the proportion of patients in this age group was 84.9%, slightly higher than it has been in the previous four years. Between 2002 and 2006 the rate of increase in use of partial hip replacement has been higher in the 75 years or older group compared to those younger than 75 years (17.9% and 1.4% respectively) (Table HP8).

Unipolar monoblock prostheses are used more often in older individuals compared to unipolar modular and bipolar prostheses. In 2006, the proportion of unipolar monoblock prostheses used in the 75 years or older age group was 91.7% compared to 79.5% unipolar modular and 81.2% bipolar prostheses. This difference in prosthesis usage is evident in the 85 years and older group where 50.9% of unipolar monoblock prostheses were used compared to 35.0% for unipolar modular and 36.3% for bipolar prostheses.

The use of unipolar monoblock prostheses in older individuals is declining. The absolute number of individuals 85 years or older receiving unipolar monoblock prostheses has decreased by 15.5% since 2002. The number of individuals in the same age group receiving the other types of partial hip replacement has increased (338% for unipolar modular and 37.5% for bipolar prostheses) (Table HP9, HP10 and HP11).

Fixation

In partial hip replacement the mode of fixation only refers to the femoral stem. Just over half of all primary partial hips are cemented (50.8%). When considering the different categories of primary partial hips, the proportion of prostheses that are cemented are 26.4% for unipolar monoblock, 75.9% for unipolar modular and 82.7% for bipolar prostheses (Table HP12).

Unipolar Monoblock
Since 2002 the use of cemented fixation in the unipolar monoblock category has progressively increased from 18% to 41.1% in 2006 (Figure HP5). There is evident state and territory variation in the use of cement fixation, which is largely a reflection of regional variation in the use of Austin Moore and Thompson prostheses (data not shown).

Unipolar Modular
In 2006 there was a slight increase in the use of cementless fixation with unipolar modular prostheses. This increase is most evident in New South Wales and Victoria (Figure HP6).

Bipolar
Although small, an increase in the use of cementless femoral stems is also evident in the bipolar prostheses category (Figure HP7).

Outcomes of Primary Partial Hip Replacements

Of the 26,863 primary partial hips analysed by the Registry for this report 786 (2.9%) have been revised with 1.6 revisions per 100 observed component years. At one year the cumulative percentage revision is 2.5% and at five years it is 5.2% (Table HG4 and HG5).

Outcomes have been compared for a variety of different factors, including age, gender, fixation and prosthesis type. For these analyses only procedures with a primary diagnosis of fractured neck of femur have been included.

Age and Gender

Age has a significant effect on the revision rate of partial hip replacements. Three age groups have been compared; the under 75s, 75-84 and 85 years or over at the time of the original procedure. As has previously been reported, in general, the older the patient the less likely they are to be revised.

The effect of age is most evident in the unipolar monoblock prosthesis category where there are significant differences between the three age groups (Figure HP8). At four years the cumulative percent revised for unipolar monoblock prostheses is 11.5% for individuals under 75 years, 5.5% for those between 75 and 84 years and 3.0% for those aged 85 years or older (Table HP14).

There is also a significantly higher rate of revision for unipolar modular prostheses for individuals less than 75 years of age compared to those 85 years or older. Although the rate of revision is higher for individuals between 75 and 84 years compared to 85 years or older this is not statistically significant (Figure HP9). The cumulative percent revised of unipolar modular prostheses at four years is almost half that of the unipolar monoblock prostheses category. For those individuals under 75 years of age it is 6.6% and 2.7% for those aged 75 to 84 years. At the time of this report there were insufficient data to provide a four year cumulative percent revision for the 85 years and older age group but at three years the cumulative percent revised is 1.1% (Table HP16).

Unlike the other two categories of partial hip replacement, age does not have a significant effect on the rate of revision for bipolar prostheses. The rate of revision for individuals less than 75 years of age is higher than those aged 75 years or older for bipolar prostheses, however this is not statistically significant (Figure HP10). The cumulative percent revised at four years for bipolar prostheses in those aged less than 75 years is 3.6%, less than the four year cumulative percent revised of both the unipolar modular (6.6%) and unipolar monoblock (11.5%) prostheses. The four year cumulative percent revised is 2.4% for those aged between 75 and 84 years of age and 2.6% for those aged 85 years or older (Table HP18).

Although males are revised more frequently in all age groups for both unipolar modular and bipolar prostheses this difference is only significant for the bipolar group (P=0.005). In the unipolar monoblock category women under 75 years of age have a higher rate of revision compared to males under 75 years, however this is not significant (Tables HP19, HP20 and HP 21).

Fixation

The use of cement fixation of the femoral stem significantly reduces the rate of revision for all categories of partial hip replacement.

Unipolar Monoblock

An analysis of revision rates based on the method of fixation for monoblock prostheses is similar but not identical to an analysis comparing the outcome of Austin Moore to Thompson prostheses. It differs because the Registry has data on a small number of cemented Austin Moore prostheses and a similar number of Thompson prostheses that have been used without cement. In addition the analysis based on fixation also includes the ETS in the cemented group.

There is a significantly greater risk of revision when a cementless monoblock prosthesis is used (hazard ratio (adjusted for age and sex) cementless v cemented monoblock = 2.063; 95% CI (1.58, 2.69) P<0.0001) (Figure HP11).The number of revisions per 100 observed component years is 1.0 for cemented prostheses and 2.0 for prostheses used without cement (Table HP22). The difference in rate of revision is greatest at one year when the cumulative percent revision for cemented prostheses is 1.0% and for cementless prostheses is 3.2%. At five years the difference has reduced, 5.4% for cemented prostheses and 6.1% for cementless (Table HP23).

Unipolar Modular

Cementless unipolar modular prostheses also have a significantly greater risk of revision compared to cemented unipolar modular prostheses (hazard ratio (adjusted for age and sex) cementless v cemented modular = 2.312; 95% CI (1.46, 3.68) P=0.0004). (Figure HP12). The number of revisions per 100 observed component years is 0.8 for cemented unipolar modular prostheses and 1.9 for cementless (Table HP24). The cumulative percentage revision at three years for cemented unipolar modular prostheses is 2.4% and for cementless it is 4.1% (Table HP25).

Bipolar

There is also a significantly greater risk of revision for bipolar prostheses when they are used with cementless stems (hazard ratio (adjusted for age and sex) cementless v cemented bipolar = 1.574; 95% CI (1.05, 2.36) P=0.0279) (Figure HP13).

The number of revisions per 100 observed component years is 0.8 for bipolar prostheses used with cemented stems and 1.5 when used with cementless stems (Table HP26). The cumulative percentage revision at three years for bipolar prostheses with cemented stems is 2.5% and with cementless stems it is 3.5% (Table HP27).

Outcome of Specific Types of Prostheses

Unipolar Monoblock

This analysis compares the three different types of prostheses; the Austin Moore, Thompson and ETS. Austin Moore and Thompson prostheses used with and without cement are considered separately. There are a variety of different manufacturers for the Austin Moore and Thompson prostheses. As with previous years the Registry has not undertaken a manufacturer specific analysis but has grouped together the various Austin Moore and Thompson prostheses and reported on the overall revision rates for these types of prostheses. The ETS is a single company product and as it is in the category of unipolar monoblock prostheses the outcome is reported along with the outcomes of the Austin Moore and Thompson prostheses each with and without cement.

For a number of years the Registry has reported the significant increase in early revision of cementless Austin Moore compared to cemented Thompson prostheses. As has been pointed out this difference is not so much related to differences in the Austin Moore compared to the Thompson but more relates to the use of cement. Although the Austin Moore is intended to be used without cement and the Thompson used with cement, the Registry also has data on Austin Moore prostheses used with cement and Thompson prostheses used without cement. When considering these four groups, cemented Thompson prostheses have the lowest number of revisions per 100 observed component years (1.2). Cemented Austin Moore prostheses have a similar rate of revision per 100 observed component years (1.6). Austin Moore prostheses used in their intended manner without cement have 2.1 revisions per 100 observed component years. The small number of Thompson prostheses used without cement has the highest rate of revision per 100 observed component years of 2.5 (Table HP28).

The cumulative percent revision of cementless Austin Moore prostheses at one

year is 3.6% and 6.0% at four years. Of the Austin Moore prostheses revisions undertaken in the first four years, half have occurred in the first twelve months. Cemented Thompson prostheses have a cumulative percent revision of 1.4% at one year and 4.5% at four years (Table HP29). The revision rate of cementless Austin Moore prostheses is significantly greater than cemented Thompson prostheses (hazard ratio (adjusted for age and sex), cementless Austin Moore v cemented Thompson = 1.843; 95%CI (1.43, 2.38) P<0.0001) (Figure HP14).

In the last Annual report the cumulative percentage revision curve of these two prostheses types, at three years, showed an apparent increase in the rate of revision for cemented Thompson prostheses. This is also evident in this year's data and as with last year the increase is related to a number of patients requiring revision for "acetabular migration".

There has been an increased use of the ETS but the total number remains small and most of the prostheses have been in for one year or less. The rate of early revision is small with only 2.2% of procedures being revised by the end of 2006.

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 rate for these combinations is presented in Table HP31.

Individual unipolar modular prostheses were analysed using the Registry algorithm to identify prosthesis and prostheses combinations with a higher than anticipated revision rate. In the last Annual report we identified the Taperloc stem and Endo II head combination as having a higher than anticipated rate of revision. It was pointed out that the number used was small and that it was only identified because the Taperloc stem was also identified in the bipolar category as having a higher rate of revision, again with only small numbers used.

This year the Taperloc stem and Endo II head combination has again been identified as a result of the routine analysis undertaken by the Registry. Since last year's report only a small number of additional procedures using this combination of prosthesis has been undertaken. There has been one additional revision (now four revisions out of 56 procedures). There has been no additional use or revisions of the Taperloc stem in the bipolar category.

Bipolar

Variable revision rates of bipolar prostheses are also apparent depending on the stem they are combined with (Table HP32 and HP33). The only prostheses that have been identified as having a higher than anticipated rate of revision compared to other bipolar prostheses are the Biomet Bipolar prosthesis and Omnifit/UHR combination.

There have been seven revisions out of 97 procedures for the Biomet Bipolar and this has been used with eleven different stems. The rate of revision is significantly different compared to other types of bipolar prostheses (hazard ratio (adjusted for age and sex) Biomet Bipolar v all other bipolar = 2.83; 95%CI (1.3, 6.1) P=0.007) (Table HP34 and HP35).

There have been no further revisions of primary procedures involving the Omnifit/UHR combination but this combination still has a significantly higher rate of revision when compared to other bipolar prostheses (hazard ratio (adjusted for age and sex) Omnifit/UHR bipolar v all other bipolar = 1.84; 95%CI (0.7, 3.1) P=0.024) (Table HP34 and Table HP35). The current use of this combination of prostheses remains small with 23 additional procedures performed in 2006 (Table HP36).

Primary Partial Hip Replacement - 1/9/1999 to 31/12/2006

Prosthesis Usage

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

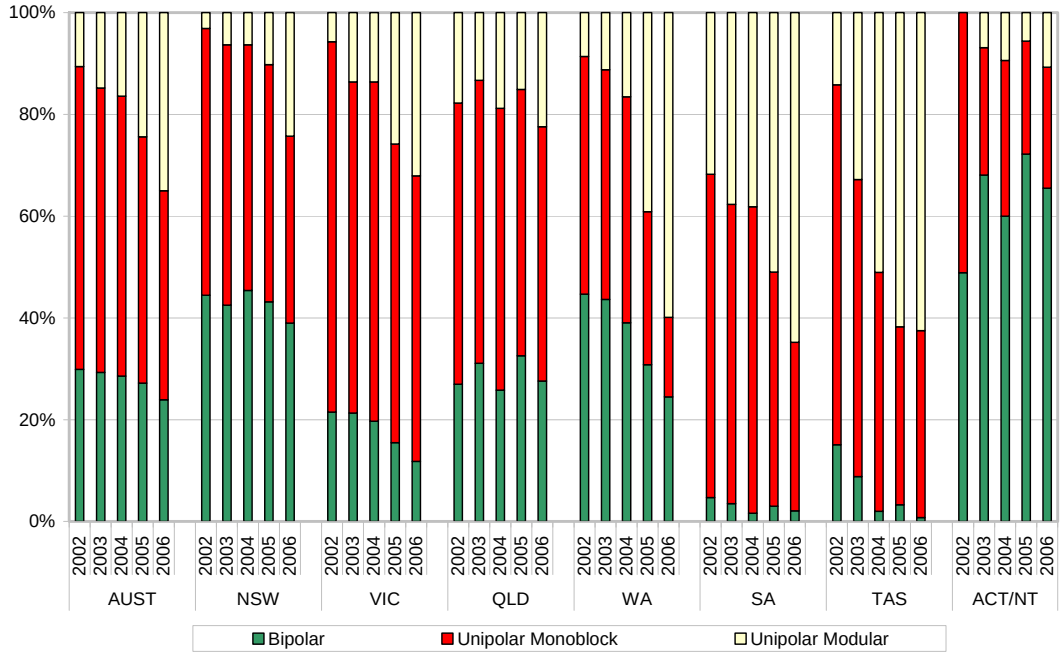


Table HP1: Unipolar Monoblock Prostheses used in Primary Partial Hips

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Austin-Moore Type (1978)	Austin-Moore Type (1985)	Austin-Moore Type (1942)	Austin-Moore Type (1532)	Austin-Moore Type (1175)
2	Thompson Type (450)	Thompson Type (523)	Thompson Type (627)	Thompson Type (617)	Thompson Type (564)
3			ETS (40)	ETS (119)	ETS (193)
% using 10 most common	100%	100%	100%	100%	100%
Total N Procedures	2428	2508	2609	2268	1932
Total N Prosthesis Types	2	2	3	3	3

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

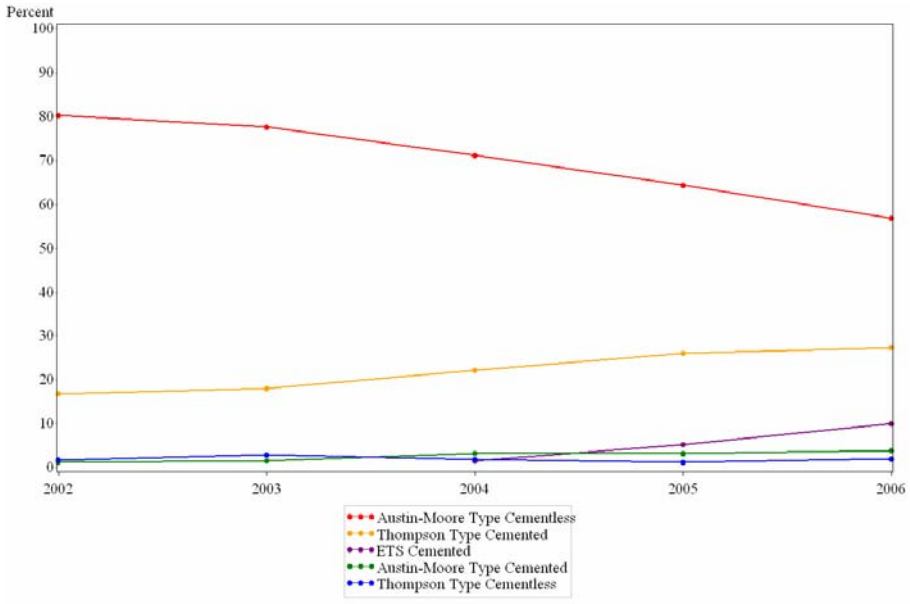


Table HP2: 10 Most common Unipolar Modular Heads used in Primary Partial Hips

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Unitrax (118)	Unitrax (193)	Unitrax (195)	Unitrax (320)	Unitrax (488)
2	Hemi (Mathys) (79)	Unipolar (Sulzer) (114)	Unipolar (S&N) (146)	Unipolar (S&N) (247)	Unipolar (S&N) (372)
3	Unipolar (S&N)) (59)	Unipolar (S&N) (90)	Hemi (Mathys) (110)	VerSys Endo (155)	Unipolar (Corin) (182)
4	Unipolar (Sulzer) (55)	VerSys Endo (75)	Unipolar (Sulzer) (101)	Hemi (Mathys) (113)	VerSys Endo (175)
5	Unipolar (Zimmer) (47)	Hemi (Mathys) (63)	VerSys Endo (87)	Unipolar (Zimmer) (100)	Unipolar (Zimmer) (141)
6	Hemi (Depuy) (32)	Hemi (Depuy) (46)	Unipolar (Endoprothetik) (65)	Unipolar (Endoprothetik) (68)	Modular Cathcart (84)
7	Ultima (24)	Unipolar Head (Endoprothetik) (38)	Endo II (22)	Endo II (42)	Unipolar Head (Endoprothetik) (62)
8	Unipolar (Sulzer) (6)	Unipolar (Zimmer) (28)	Modular Endo (13)	Unipolar (Corin) (28)	Hemi (Mathys) (57)
9	Lubinus SP II (5)	Ultima (16)	Hemi (Depuy) (12)	Unipolar (Sulzer) (21)	Endo II (29)
10	VerSys Endo (3)	Unipolar (Sulzer) (1)	Unipolar (Zimmer) (12)	Modular Cathcart (20)	Hemi (Depuy) (15)
% using 10 most common	99.1%	100%	98.1%	97.6%	97.7%
Total N Procedures	432	664	778	1141	1642
Total N Prosthesis Types	12	10	14	14	17

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

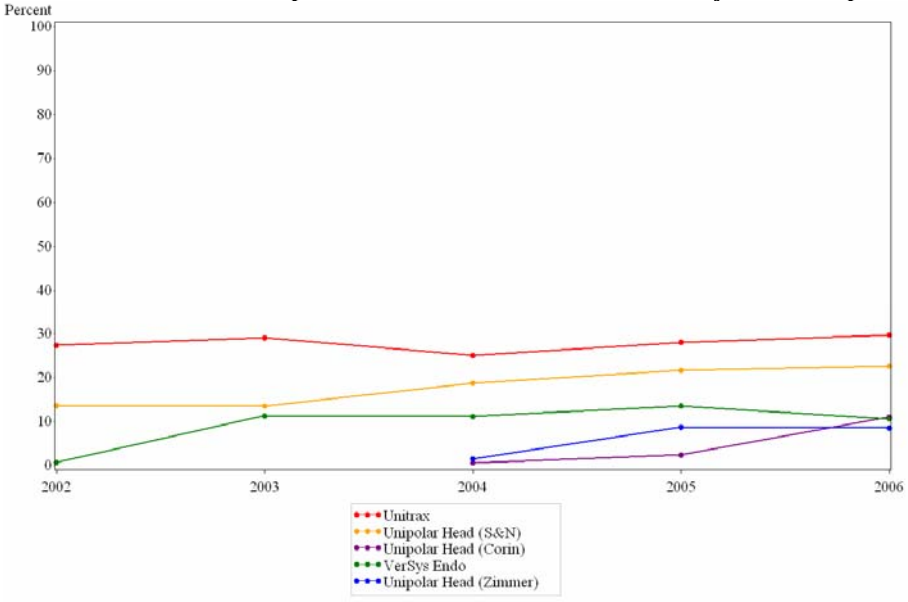


Table HP3: 10 Most common Bipolar Heads used in Primary Partial Hips

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	UHR (689)	UHR (737)	UHR (642)	UHR (606)	UHR (533)
2	Hastings (133)	Hastings (140)	Convene (192)	Tandem (129)	Tandem (209)
3	Endo (Depuy) (106)	Convene (115)	Hastings (138)	Convene (107)	Multipolar Bipolar (97)
4	Convene (96)	Bipolar (Sulzer) (91)	Endo Cup (Depuy) (114)	Multipolar Bipolar (99)	Endo (Depuy) (64)
5	Bipolar (Sulzer) (68)	Endo (Depuy) (82)	Bipolar (Sulzer) (100)	Hastings (96)	Hastings (58)
6	Bipolar (Zimmer) (43)	Multipolar Bipolar (58)	Multipolar Bipolar (90)	Endo (Depuy) (87)	Convene (40)
7	Bipolar (Mathys) (29)	Bipolar (Mathys) (39)	Bipolar (Mathys) (21)	Bipolar (Sulzer) (77)	Bipolar (Zimmer) (38)
8	Bipolar (Biomet) (16)	Bipolar (Lima) (19)	Bipolar (Biomet) (20)	Bipolar (Mathys) (24)	Bipolar (Sulzer) (32)
9	Centrax (10)	Bipolar (Biomet) (19)	UHL (11)	Bipolar (Biomet) (16)	Bipolar (Biomet) (16)
10	Bipolar (Lima) (8)	Self-Centering (5)	Bipolar (Lima) (10)	Bipolar (Zimmer) (11)	Bipolar (Mathys) (6)
% using 10 most common	98.1%	99.2%	98.4%	98.1%	97.4%
Total N Procedures	1221	1316	1360	1276	1122
Total N Prosthesis Types	16	13	17	17	18

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

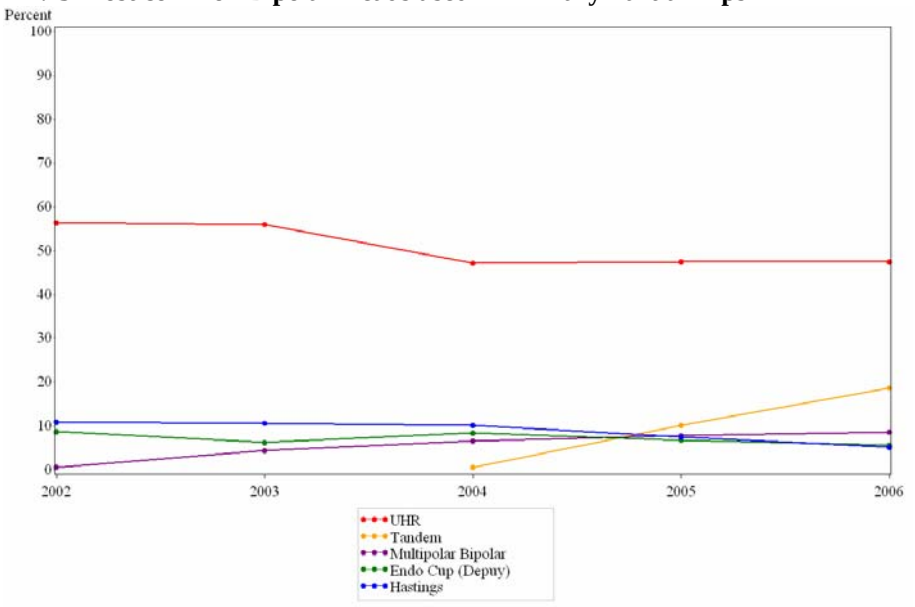


Table HP4: Usage of Partial Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	3041	74.5	1040	25.5	4081	100.0
2003	3387	75.5	1101	24.5	4488	100.0
2004	3477	73.2	1270	26.8	4747	100.0
2005	3484	74.4	1201	25.6	4685	100.0
2006	3426	73.0	1270	27.0	4696	100.0

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

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	1830	75.4	598	24.6	2428	100.0
2003	1901	75.8	607	24.2	2508	100.0
2004	1910	73.2	699	26.8	2609	100.0
2005	1703	75.1	565	24.9	2268	100.0
2006	1380	71.4	552	28.6	1932	100.0

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

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	313	72.5	119	27.5	432	100.0
2003	505	76.1	159	23.9	664	100.0
2004	582	74.8	196	25.2	778	100.0
2005	855	74.9	286	25.1	1141	100.0
2006	1206	73.4	436	26.6	1642	100.0

Table HP7: Usage of Bipolar Partial Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	898	73.5	323	26.5	1221	100.0
2003	981	74.5	335	25.5	1316	100.0
2004	985	72.4	375	27.6	1360	100.0
2005	926	72.6	350	27.4	1276	100.0
2006	840	74.9	282	25.1	1122	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	%
2002	48	1.2	120	2.9	530	13.0	1819	44.6	1564	38.3	4081	100.0
2003	57	1.3	159	3.5	547	12.2	1896	42.2	1829	40.8	4488	100.0
2004	49	1.0	149	3.1	608	12.8	2028	42.7	1913	40.3	4747	100.0
2005	55	1.2	156	3.3	595	12.7	2017	43.1	1862	39.7	4685	100.0
2006	43	0.9	140	3.0	525	11.2	2023	43.1	1965	41.8	4696	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	%
2002	6	0.2	29	1.2	188	7.7	1068	44.0	1137	46.8	2428	100.0
2003	7	0.3	35	1.4	187	7.5	1004	40.0	1275	50.8	2508	100.0
2004	6	0.2	23	0.9	212	8.1	1086	41.6	1282	49.1	2609	100.0
2005	7	0.3	26	1.1	176	7.8	932	41.1	1127	49.7	2268	100.0
2006	0	0.0	26	1.3	134	6.9	788	40.8	984	50.9	1932	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	%
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	108	16.3	304	45.8	212	31.9	664	100.0
2004	14	1.8	44	5.7	139	17.9	340	43.7	241	31.0	778	100.0
2005	18	1.6	60	5.3	218	19.1	505	44.3	340	29.8	1141	100.0
2006	20	1.2	68	4.1	249	15.2	731	44.5	574	35.0	1642	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	%
2002	31	2.5	70	5.7	264	21.6	560	45.9	296	24.2	1221	100.0
2003	40	3.0	94	7.1	252	19.1	588	44.7	342	26.0	1316	100.0
2004	29	2.1	82	6.0	257	18.9	602	44.3	390	28.7	1360	100.0
2005	30	2.4	70	5.5	201	15.8	580	45.5	395	31.0	1276	100.0
2006	23	2.0	46	4.1	142	12.7	504	44.9	407	36.3	1122	100.0

Table HP12: Prosthesis fixation - Partial Hip Replacement

Fixation	*Unipolar Monoblock*		*Unipolar Modular*		*Bipolar*		*All Patients*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Cemented	3842	14.3	3887	14.5	5930	22.1	13659	50.8
Cementless	10729	39.9	1233	4.6	1242	4.6	13204	49.2
Total	**14571**	**54.2**	**5120**	**19.1**	**7172**	**26.7**	**26863**	**100.0**

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

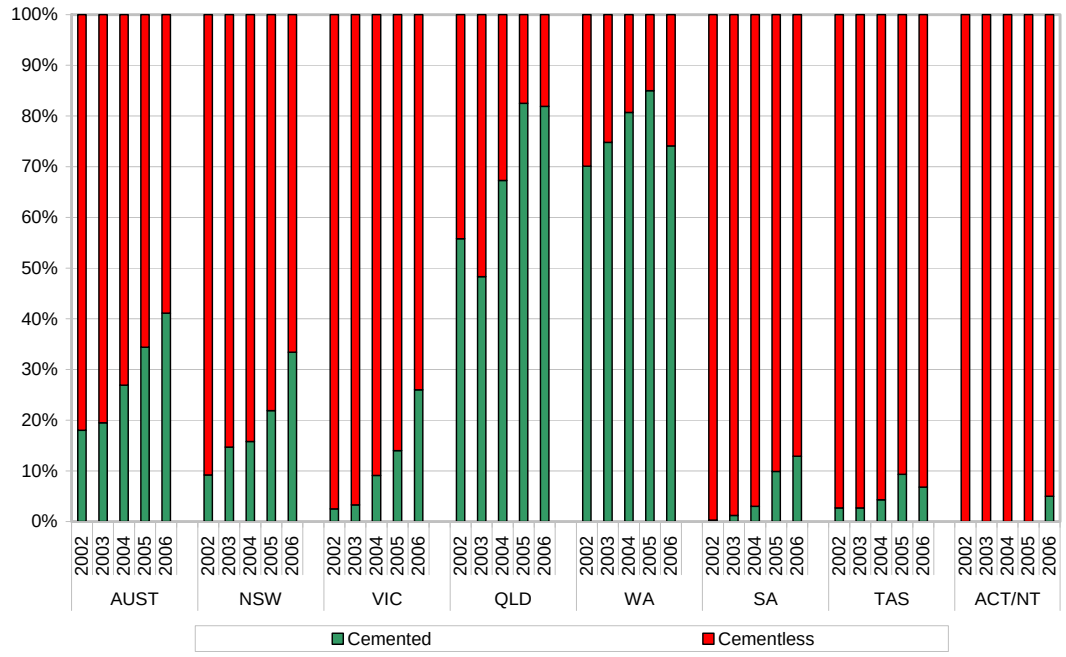


Figure HP6: Trends in Prosthesis Fixation - Femoral components used with Unipolar Modular prostheses by State and Territory

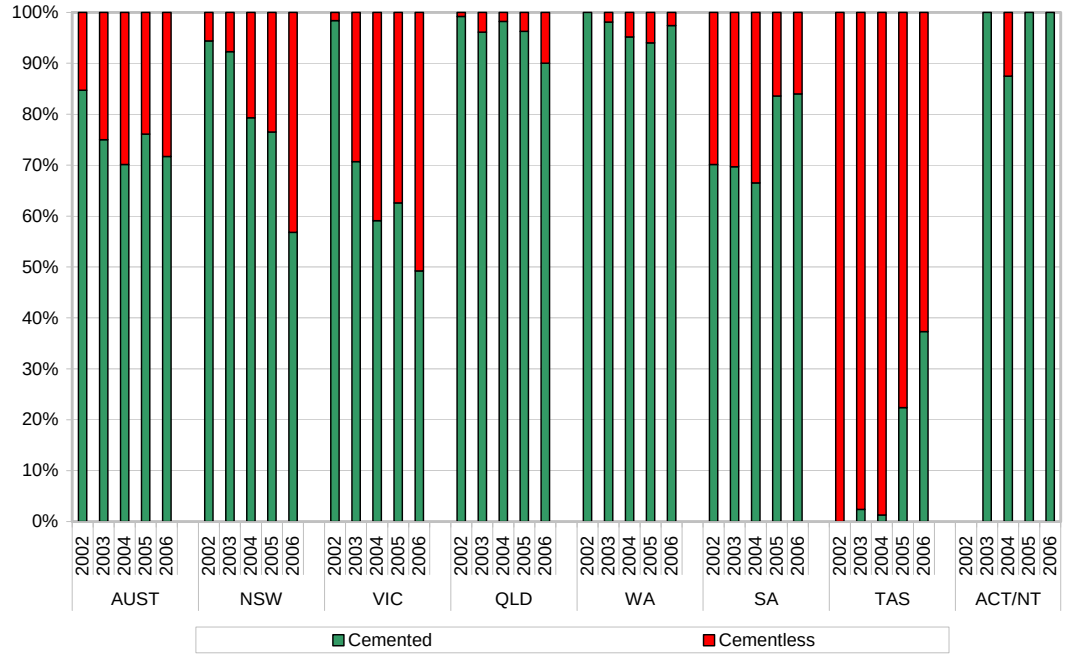


Figure HP7: Trends in Prosthesis Fixation - Femoral components used with Bipolar prostheses by State and Territory

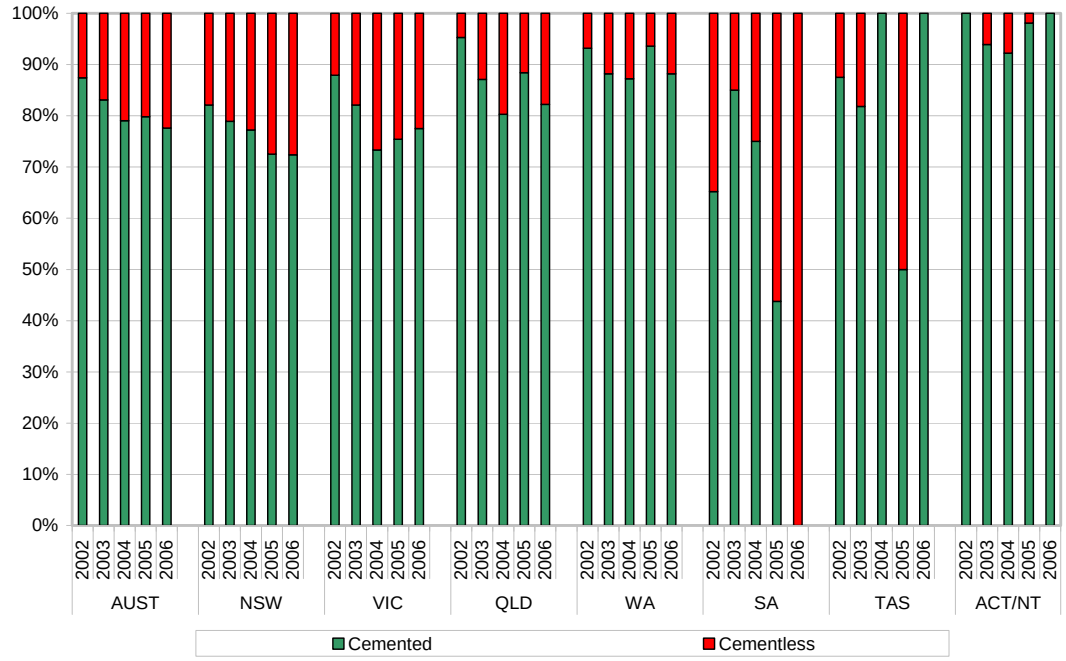
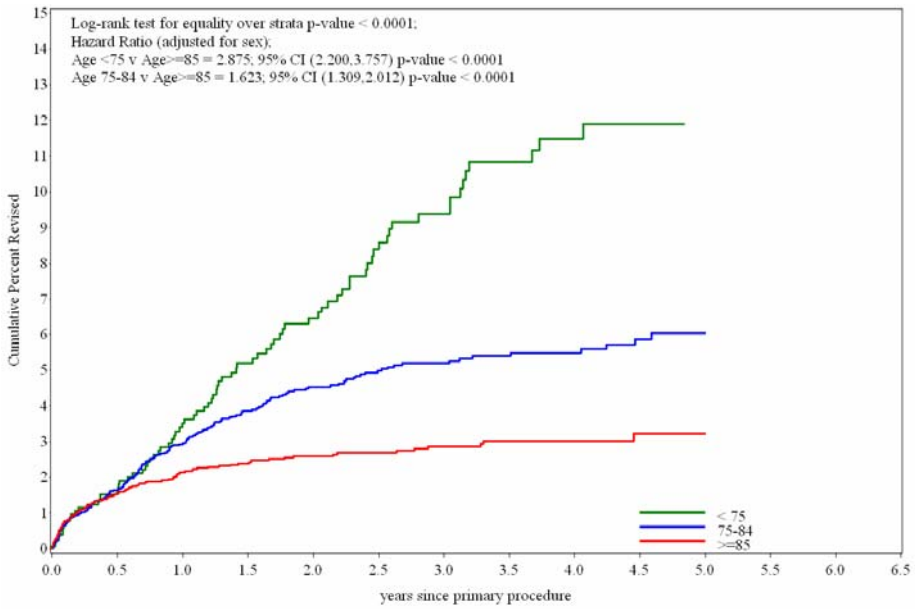


Table HP13: Primary Unipolar Monoblock Hip Procedures Requiring Revision by Age (primary diagnosis Fractured NOF excluding infection)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
< 75	90	1325	6.8	2797	3.2	(2.59, 3.96)
75-84	212	5879	3.6	11319	1.9	(1.63, 2.14)
>= 85	137	6952	2.0	11296	1.2	(1.02, 1.43)
Total	**439**	**14156**	**3.1**	**25412**	**1.7**	**(1.57, 1.90)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<75	1325	1020	859	724	589	479	398	305	232	164	111	65	34
75-84	5879	4298	3557	2983	2430	1904	1494	1148	888	592	390	214	85
>=85	6952	4545	3680	2981	2370	1855	1414	1049	735	484	294	151	64

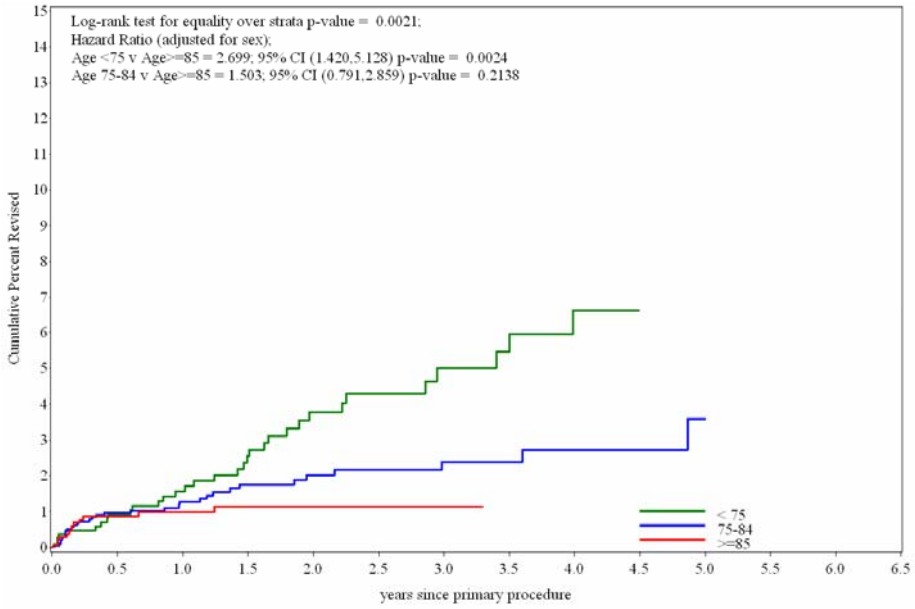
Table HP14: Yearly cumulative percentage revision of Primary Unipolar Monoblock Hip Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
<75	3.5 (2.5, 4.8)	6.4 (5.0, 8.3)	9.4 (7.5, 11.7)	11.5 (9.2, 14.3)	
75-84	3.0 (2.5, 3.5)	4.5 (3.9, 5.2)	5.2 (4.5, 6.0)	5.5 (4.7, 6.3)	6.0 (5.1, 7.1)
>=85	2.1 (1.8, 2.6)	2.6 (2.2, 3.1)	2.9 (2.4, 3.4)	3.0 (2.5, 3.6)	3.2 (2.6, 4.0)

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*
< 75	34	1091	3.1	2094	1.6	(1.12, 2.27)
75-84	33	2088	1.6	3596	0.9	(0.63, 1.29)
>= 85	13	1510	0.9	2003	0.6	(0.35, 1.11)
Total	**80**	**4689**	**1.7**	**7694**	**1.0**	**(0.82, 1.29)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<75	1091	858	690	544	415	325	258	191	146	108	72	46	24
75-84	2088	1547	1183	912	711	560	439	308	212	147	108	61	24
>=85	1510	943	710	510	397	281	201	129	87	59	31	15	8

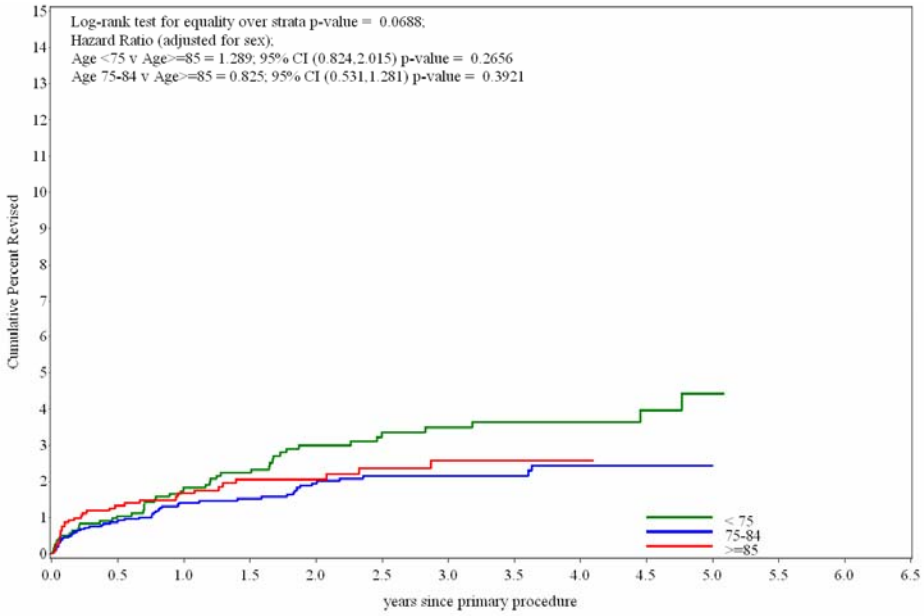
Table HP16: Yearly cumulative percentage revision of Primary Unipolar Modular Hip Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
<75	1.6 (0.9, 2.6)	3.8 (2.5, 5.6)	5.0 (3.4, 7.3)	6.6 (4.4, 9.8)	6.6 (4.4, 9.8)
75-84	1.3 (0.8, 1.9)	2.0 (1.4, 2.9)	2.4 (1.6, 3.5)	2.7 (1.8, 4.1)	3.6 (2.0, 6.3)
>=85	1.0 (0.6, 1.7)	1.1 (0.7, 2.0)	1.1 (0.7, 2.0)		

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*
< 75	47	1613	2.9	4186	1.1	(0.82, 1.49)
75-84	50	2939	1.7	6679	0.7	(0.56, 0.99)
>= 85	33	1852	1.8	3273	1.0	(0.69, 1.42)
Total	**130**	**6404**	**2.0**	**14139**	**0.9**	**(0.77, 1.09)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<75	1613	1367	1231	1081	946	800	652	520	397	278	171	85	48
75-84	2939	2423	2089	1756	1488	1197	973	755	553	349	207	117	60
>=85	1852	1337	1091	892	701	553	418	296	199	100	51	30	15

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*	*4 years*	*5 years*
<75	1.8 (1.2, 2.7)	3.0 (2.2, 4.1)	3.5 (2.6, 4.7)	3.6 (2.7, 4.9)	4.4 (3.1, 6.2)
75-84	1.4 (1.0, 1.9)	1.9 (1.4, 2.6)	2.2 (1.6, 2.9)	2.4 (1.8, 3.3)	2.4 (1.8, 3.3)
>=85	1.7 (1.1, 2.4)	2.1 (1.4, 3.0)	2.6 (1.8, 3.7)	2.6 (1.8, 3.7)	

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	71	887	8.0	2055	3.5	(2.70, 4.36)
Female 75-84	167	4335	3.9	9185	1.8	(1.55, 2.12)
Female >=85	104	5335	1.9	9510	1.1	(0.89, 1.33)
Males by Age						
Male <75	19	438	4.3	741	2.6	(1.54, 4.00)
Male 75-84	45	1544	2.9	2134	2.1	(1.54, 2.82)
Male >=85	33	1617	2.0	1786	1.8	(1.27, 2.60)
Total	**439**	**14156**	**3.1**	**25412**	**1.7**	**(1.57, 1.90)**

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	23	772	3.0	1559	1.5	(0.94, 2.21)
Female 75-84	22	1583	1.4	2855	0.8	(0.48, 1.17)
Female >=85	11	1142	1.0	1630	0.7	(0.34, 1.21)
Males by Age						
Male <75	11	319	3.4	535	2.1	(1.03, 3.68)
Male 75-84	11	505	2.2	741	1.5	(0.74, 2.66)
Male >=85	2	368	0.5	373	0.5	(0.06, 1.94)
Total	**80**	**4689**	**1.7**	**7694**	**1.0**	**(0.82, 1.29)**

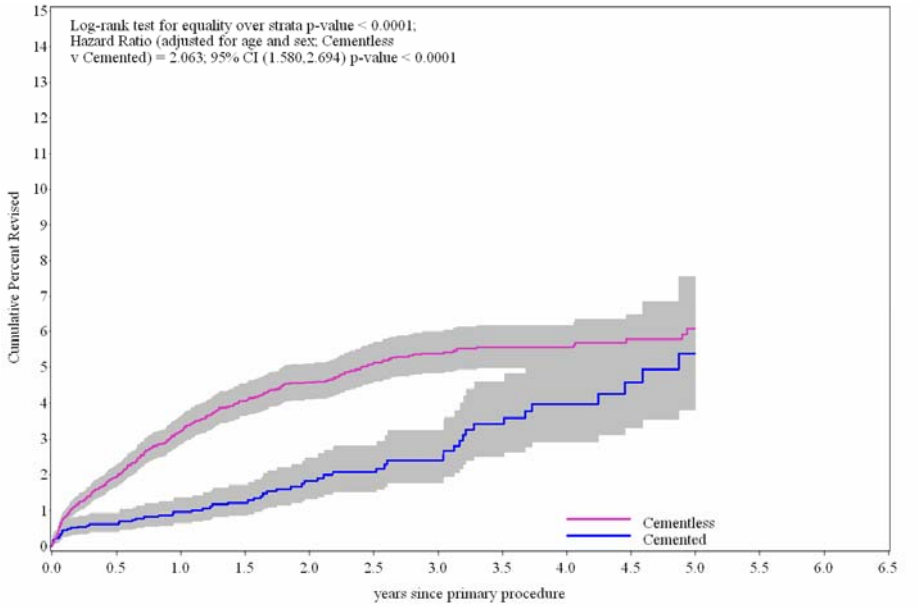
Table HP21: Primary Bipolar Hip Procedures Requiring Revision by Sex and Age (primary diagnosis Fractured NOF excluding infection)

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	29	1166	2.5	3154	0.9	(0.62, 1.32)
Female 75-84	31	2214	1.4	5243	0.6	(0.40, 0.84)
Female >=85	25	1369	1.8	2586	1.0	(0.63, 1.43)
Males by Age						
Male <75	18	447	4.0	1032	1.7	(1.03, 2.76)
Male 75-84	19	725	2.6	1436	1.3	(0.80, 2.07)
Male >=85	8	483	1.7	687	1.2	(0.50, 2.29)
Total	**130**	**6404**	**2.0**	**14139**	**0.9**	**(0.77, 1.09)**

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	63	3728	1.7	6264	1.0	(0.77, 1.29)
Cementless	376	10428	3.6	19148	2.0	(1.77, 2.17)
Total	**439**	**14156**	**3.1**	**25412**	**1.7**	**(1.57, 1.90)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Cemented	3728	2593	2084	1662	1282	955	736	555	409	279	195	115	55
Cementless	10428	7270	6012	5026	4107	3283	2570	1947	1446	961	600	315	128

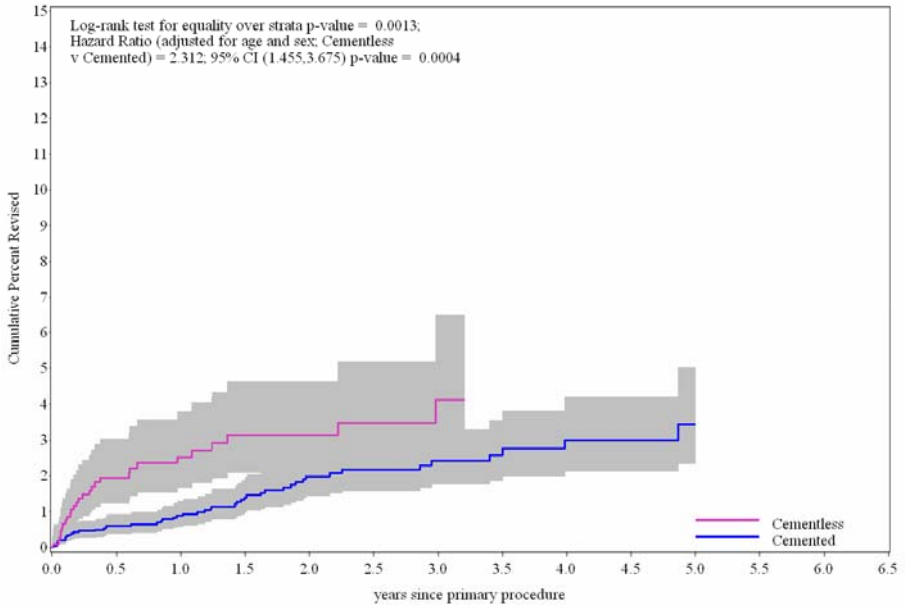
Table HP23: Yearly cumulative percentage revision of Primary Unipolar Monoblock Hip Procedures by femoral cement

Fixation	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Cemented	1.0 (0.7, 1.4)	1.8 (1.3, 2.5)	2.4 (1.8, 3.3)	4.0 (2.9, 5.4)	5.4 (3.8, 7.6)
Cementless	3.2 (2.8, 3.6)	4.6 (4.1, 5.1)	5.4 (4.8, 6.0)	5.5 (5.0, 6.2)	6.1 (5.4, 6.9)

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	51	3537	1.4	6152	0.8	(0.62, 1.09)
Cementless	29	1152	2.5	1542	1.9	(1.26, 2.70)
Total	**80**	**4689**	**1.7**	**7694**	**1.0**	**(0.82, 1.29)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Cemented	3537	2583	2019	1545	1201	942	755	550	404	293	204	120	56
Cementless	1152	765	564	421	322	224	143	78	41	21	7	2	0

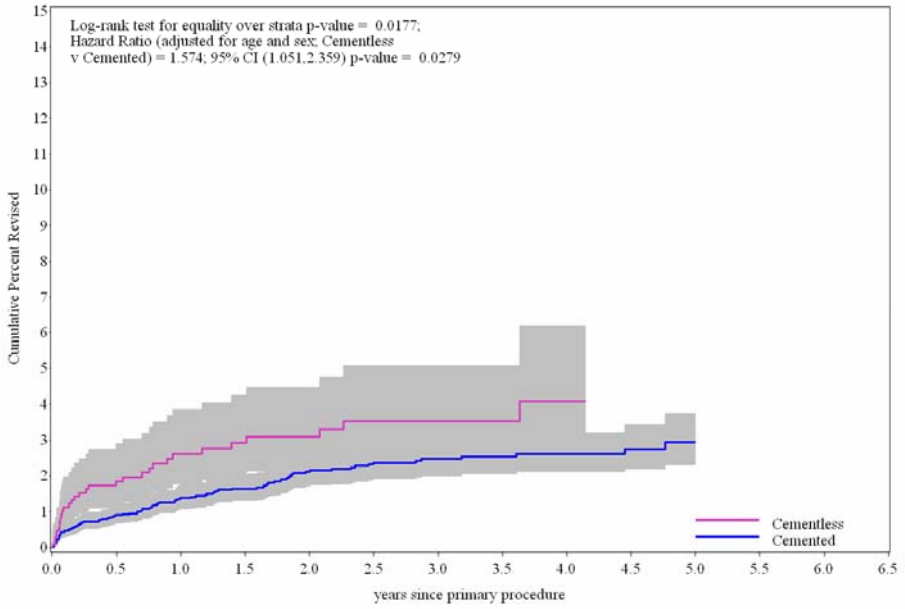
Table HP25: Yearly cumulative percentage revision of Primary Unipolar Modular Hip Procedures by Femoral Cement

Fixation	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Cemented	0.9 (0.6, 1.3)	2.0 (1.4, 2.7)	2.4 (1.8, 3.3)	3.0 (2.1, 4.2)	3.4 (2.3, 5.0)
Cementless	2.5 (1.7, 3.8)	3.1 (2.1, 4.6)	4.1 (2.6, 6.5)		

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	99	5301	1.9	12018	0.8	(0.67, 1.00)
Cementless	31	1103	2.8	2121	1.5	(0.99, 2.07)
Total	**130**	**6404**	**2.0**	**14139**	**0.9**	**(0.77, 1.09)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Cemented	5301	4262	3701	3156	2664	2187	1777	1390	1018	656	389	209	106
Cementless	1103	865	710	573	471	363	266	181	131	71	40	23	17

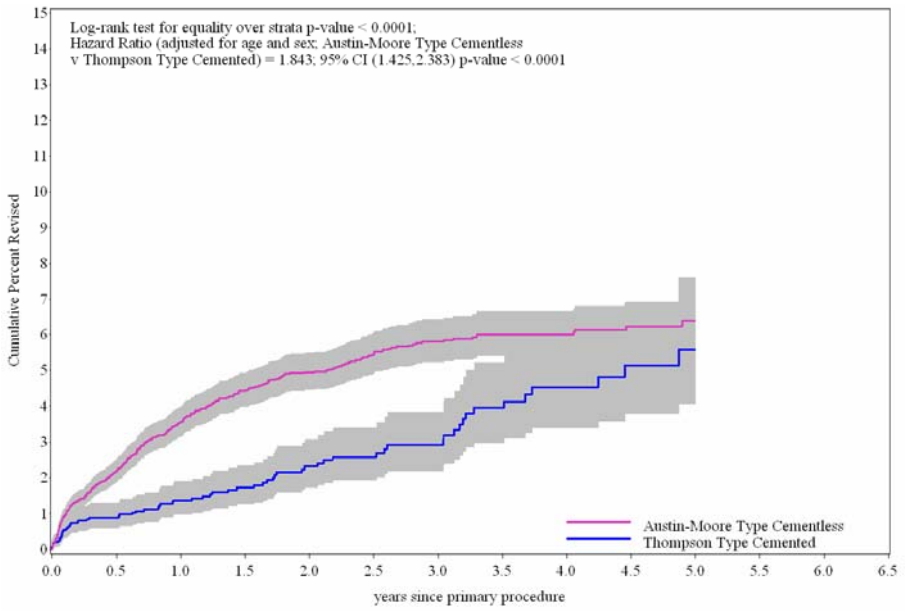
Table HP27: Yearly cumulative percentage revision of Primary Bipolar Hip Procedures by Femoral Cement

Fixation	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Cemented	1.4 (1.1, 1.8)	2.1 (1.7, 2.6)	2.5 (2.0, 3.0)	2.6 (2.1, 3.2)	2.9 (2.3, 3.7)
Cementless	2.6 (1.8, 3.8)	3.1 (2.1, 4.5)	3.5 (2.4, 5.1)	4.1 (2.7, 6.2)	

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	7	329	2.1	443	1.6	(0.64, 3.26)
Austin-Moore Type Cementless	406	10433	3.9	19008	2.1	(1.93, 2.35)
ETS Cemented	3	352	0.9	291	1.0	(0.21, 3.02)
Thompson Type Cemented	68	3161	2.2	5685	1.2	(0.93, 1.52)
Thompson Type Cementless	15	296	5.1	589	2.5	(1.42, 4.20)
Total	**499**	**14571**	**3.4**	**26016**	**1.9**	**(1.75, 2.09)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Austin-Moore Cementless	10433	7221	5963	4979	4063	3246	2544	1937	1443	958	604	317	127
Thompson Cemented	3161	2249	1849	1503	1192	914	709	536	400	277	195	113	54

Table HP29: Yearly cumulative percentage revision of Primary Unipolar Monoblock Prostheses

Unipolar Monoblock	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Austin-Moore Type Cemented	1.6 (0.6, 4.4)	3.4 (1.4, 8.1)	3.4 (1.4, 8.1)		
Austin-Moore Type Cementless	3.6 (3.2, 4.0)	4.9 (4.5, 5.5)	5.8 (5.2, 6.4)	6.0 (5.4, 6.6)	6.4 (5.7, 7.1)
ETS Cemented	0.8 (0.2, 3.1)				
Thompson Type Cemented	1.4 (1.0, 1.9)	2.3 (1.7, 3.1)	2.9 (2.2, 3.9)	4.5 (3.4, 6.0)	5.6 (4.1, 7.6)
Thompson Type Cementless	4.1 (2.2, 7.6)	4.8 (2.7, 8.7)	6.4 (3.7, 11.1)	7.6 (4.3, 13.0)	

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)	11	305	3.6	700	1.6	(0.78, 2.81)
Alloclassic	Unipolar Head (Zimmer)	2	204	1.0	167	1.2	(0.14, 4.32)
C-Stem	Hemi Head (Depuy)	2	52	3.8	158	1.3	(0.15, 4.57)
CCA	Hemi Head (Mathys)	5	319	1.6	731	0.7	(0.22, 1.60)
CPCS	Unipolar Head (S&N)	1	261	0.4	194	0.5	(0.01, 2.88)
CPT	Unipolar Type (Zimmer)	6	146	4.1	551	1.1	(0.40, 2.37)
CPT	VerSys Endo	7	422	1.7	535	1.3	(0.53, 2.69)
Corail	Modular Cathcart	2	99	2.0	51	3.9	(0.47, 14.15)
Elite Plus	Hemi Head (Depuy)	0	76	0.0	151	0.0	(0.00, 2.44)
Exeter V40	Unitrax	25	1282	2.0	1881	1.3	(0.86, 1.96)
Fullfix Stem	Hemi Head (Mathys)	2	199	1.0	367	0.5	(0.07, 1.97)
SL-Plus	Unipolar (Endoprothetik)	7	231	3.0	350	2.0	(0.81, 4.13)
Spectron EF	Unipolar Head (S&N)	17	680	2.5	1193	1.4	(0.83, 2.28)
Taper Fit	Unipolar Head (Corin)	0	79	0.0	51	0.0	(0.00, 7.18)
Taperloc	Endo II	4	56	7.1	70	5.7	(1.55, 14.56)
Thompson Mod	Ultima	1	124	0.8	396	0.3	(0.01, 1.41)
Trifit	Unipolar Head (Corin)	1	136	0.7	55	1.8	(0.05, 10.06)
VerSys	VerSys Endo	1	71	1.4	93	1.1	(0.03, 5.96)
Other (60)	-	10	378	2.6	529	1.9	(0.91, 3.48)
Total		**104**	**5120**	**2.0**	**8223**	**1.3**	**(1.03, 1.53)**

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*	*5 years*
Alloclassic	Unipolar Head (Sulzer)	3.5 (1.8, 6.6)	3.9 (2.1, 7.2)	3.9 (2.1, 7.2)	5.6 (2.7, 11.4)	
Alloclassic	Unipolar Head (Zimmer)	1.2 (0.3, 4.6)				
C-Stem	Hemi Head (Depuy)	2.2 (0.3, 14.4)	2.2 (0.3, 14.4)	2.2 (0.3, 14.4)	6.1 (1.5, 23.4)	6.1 (1.5, 23.4)
CCA	Hemi Head (Mathys)	1.1 (0.3, 3.3)	2.1 (0.9, 5.2)	2.1 (0.9, 5.2)	2.1 (0.9, 5.2)	2.1 (0.9, 5.2)
CPCS	Unipolar Head (S&N)	0				
CPT	Unipolar Type (Zimmer)	0.8 (0.1, 5.3)	2.3 (0.8, 7.0)	3.2 (1.2, 8.3)	4.5 (1.8, 10.6)	6.6 (2.8, 15.2)
CPT	VerSys Endo	1.7 (0.7, 3.7)	1.7 (0.7, 3.7)	2.8 (1.1, 6.8)		
Corail	Modular Cathcart	2.4 (0.6, 9.3)				
Elite Plus	Hemi Head (Depuy)	0	0	0	0	
Exeter V40	Unitrax	1.4 (0.8, 2.4)	3.0 (1.9, 4.7)	3.5 (2.2, 5.5)		
Fullfix Stem	Hemi Head (Mathys)	0.5 (0.1, 3.8)	1.5 (0.4, 6.4)	1.5 (0.4, 6.4)		
SL-Plus	Unipolar (Endoprothetik)	1.9 (0.7, 5.0)	2.6 (1.1, 6.3)	7.5 (2.7, 19.7)		
Spectron EF	Unipolar Head (S&N)	1.8 (1.0, 3.4)	3.3 (1.9, 5.8)	4.5 (2.6, 7.8)	4.5 (2.6, 7.8)	
Taper Fit	Unipolar Head (Corin)	0				
Taperloc	Endo II	8.0 (3.1, 20.0)	8.0 (3.1, 20.0)			
Thompson Mod	Ultima	0.8 (0.1, 5.9)	0.8 (0.1, 5.9)	0.8 (0.1, 5.9)	0.8 (0.1, 5.9)	0.8 (0.1, 5.9)
Trifit	Unipolar Head (Corin)					
VerSys	VerSys Endo	2.3 (0.3, 15.4)	2.3 (0.3, 15.4)	2.3 (0.3, 15.4)		
Other (60)	-	3.1 (1.6, 5.9)	3.8 (2.0, 7.3)	3.8 (2.0, 7.3)		

***Note**: Cumulative Percent Revised equal to 0 indicates that the prosthesis combination has been followed up to this time with no revisions recorded*

The Cumulative Percent Revised for the Trifit/Unipolar Head (Corin) combination has had one revision however has not been followed up for a full year

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	6	129	4.7	260	2.3	(0.85, 5.03)
Alloclassic	Bipolar Ballhead (Sulzer)	6	305	2.0	673	0.9	(0.33, 1.94)
C-Stem	Endo Cup (Depuy)	1	102	1.0	213	0.5	(0.01, 2.61)
C-Stem	Hastings	6	126	4.8	386	1.6	(0.57, 3.38)
CCA	Bipolar Head (Mathys)	2	87	2.3	221	0.9	(0.11, 3.26)
CPCS	Convene	9	342	2.6	645	1.4	(0.64, 2.65)
CPCS	Tandem	6	272	2.2	189	3.2	(1.17, 6.92)
CPT	Multipolar Bipolar	2	79	2.5	102	2.0	(0.24, 7.09)
Charnley	Hastings	2	72	2.8	148	1.3	(0.16, 4.88)
Corail	Endo Cup (Depuy)	1	59	1.7	64	1.6	(0.04, 8.72)
Corail	Hastings	2	109	1.8	164	1.2	(0.15, 4.39)
Elite Plus	Endo Cup (Depuy)	1	227	0.4	556	0.2	(0.00, 1.00)
Elite Plus	Hastings	11	298	3.7	824	1.3	(0.67, 2.39)
Exeter	Centrax	5	202	2.5	813	0.6	(0.20, 1.44)
Exeter	UHR	8	203	3.9	747	1.1	(0.46, 2.11)
Exeter V40	Centrax	0	64	0.0	251	0.0	(0.00, 1.47)
Exeter V40	UHR	54	2645	2.0	5261	1.0	(0.77, 1.34)
MS 30	Bipolar Ballhead (Sulzer)	1	58	1.7	176	0.6	(0.01, 3.16)
Omnifit	UHR	15	300	5.0	827	1.8	(1.02, 2.99)
Spectron EF	Convene	7	163	4.3	445	1.6	(0.63, 3.24)
VerSys	Multipolar Bipolar	0	230	0.0	310	0.0	(0.00, 1.19)
Other (143)	-	38	1100	3.5	2247	1.7	(1.20, 2.32)
Total		**183**	**7172**	**2.6**	**15522**	**1.2**	**(1.01, 1.36)**

Table HP33: Yearly cumulative percentage revision of Primary Bipolar Hip Prostheses

Femoral Component	*Bipolar*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
ABGII	UHR	3.5 (1.3, 9.1)	3.5 (1.3, 9.1)	5.1 (2.1, 12.3)		
Alloclassic	Bipolar (Sulzer)	1.1 (0.4, 3.4)	2.5 (1.1, 5.6)	2.5 (1.1, 5.6)	2.5 (1.1, 5.6)	
C-Stem	Endo Cup (Depuy)	0	1.4 (0.2, 9.2)	1.4 (0.2, 9.2)		
C-Stem	Hastings	2.5 (0.8, 7.5)	4.5 (1.9, 10.6)	5.8 (2.6, 12.6)	5.8 (2.6, 12.6)	5.8 (2.6, 12.6)
CCA	Bipolar (Mathys)	1.3 (0.2, 8.6)	2.9 (0.7, 11.4)	2.9 (0.7, 11.4)	2.9 (0.7, 11.4)	
CPCS	Convene	2.3 (1.1, 4.7)	2.7 (1.4, 5.4)	2.7 (1.4, 5.4)		
CPCS	Tandem	4.2 (1.8, 9.7)				
CPT	Multipolar Bipolar	1.7 (0.2, 11.6)	5.0 (1.2, 19.7)	5.0 (1.2, 19.7)		
Charnley	Hastings	0	5.6 (1.4, 20.7)	5.6 (1.4, 20.7)	5.6 (1.4, 20.7)	
Corail	Endo Cup (Depuy)	2.0 (0.3, 13.1)	2.0 (0.3, 13.1)			
Corail	Hastings	2.0 (0.5, 7.9)	2.0 (0.5, 7.9)	2.0 (0.5, 7.9)		
Elite Plus	Endo Cup (Depuy)	0(0.0, .)	0.7 (0.1, 5.1)	0.7 (0.1, 5.1)	0.7 (0.1, 5.1)	
Elite Plus	Hastings	1.9 (0.8, 4.6)	3.4 (1.7, 6.8)	4.7 (2.5, 8.8)	4.7 (2.5, 8.8)	5.9 (3.1, 10.9)
Exeter	Centrax	2.1 (0.8, 5.5)	2.7 (1.1, 6.5)	2.7 (1.1, 6.5)	2.7 (1.1, 6.5)	2.7 (1.1, 6.5)
Exeter	UHR	1.6 (0.5, 5.0)	2.2 (0.8, 5.8)	3.6 (1.6, 7.9)	4.3 (2.1, 8.9)	5.5 (2.7, 11.2)
Exeter V40	Centrax	0	0	0	0	0
Exeter V40	UHR	1.9 (1.4, 2.6)	2.4 (1.8, 3.2)	2.5 (1.9, 3.3)	2.8 (2.1, 3.8)	2.8 (2.1, 3.8)
MS 30	Bipolar (Sulzer)	1.9 (0.3, 12.4)	1.9 (0.3, 12.4)	1.9 (0.3, 12.4)	1.9 (0.3, 12.4)	
Omnifit	UHR	4.3 (2.5, 7.5)	4.8 (2.8, 8.2)	4.8 (2.8, 8.2)	5.6 (3.3, 9.5)	5.6 (3.3, 9.5)
Spectron EF	Convene	2.0 (0.6, 6.2)	2.9 (1.1, 7.6)	4.0 (1.6, 9.5)	5.2 (2.3, 11.5)	7.6 (3.3, 16.9)
VerSys	Multipolar Bipolar	0.)	0	0		
Other (143)	-	3.2 (2.2, 4.5)	3.8 (2.7, 5.4)	4.7 (3.4, 6.5)	4.7 (3.4, 6.5)	

***Note**: Cumulative Percent Revised equal to 0 indicates that the prosthesis combination has been followed up to this time with no revisions recorded*

Primary Bipolar Hip Replacement Prostheses with

a higher than anticipated revision rate

Table HP34: Individual Primary Bipolar Hip Prostheses with higher than anticipated revision rates either alone or in combination

Femoral Component	*Bipolar Component*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Hazard Ratio*	*P Value*	*Exact 95%CI*
*	Bipolar (Biomet)	97	7.2	198	3.5	2.83	0.007	(1.3, 6.1)
Omnifit	UHR	300	5.0	827	1.8	1.84	0.024	(0.7, 3.1)

Note: *Bipolar components have been compared to all other bipolar components*
**= includes all models of femoral components used with the listed bipolar component*

Figures HP15-16: Cumulative percentage revision of individual primary bipolar hip prostheses that have been identified as having a higher than anticipated revision rate

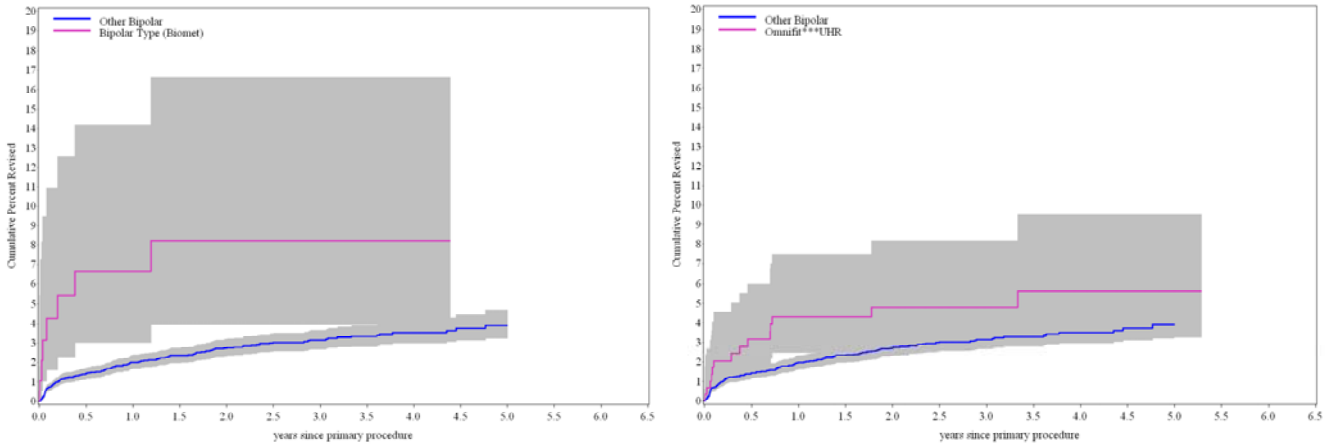


Table HP35: Yearly cumulative percentage revision of individual Primary Bipolar prostheses that have been identified as having a higher than anticipated revision rate

Femoral Component	*Bipolar Component*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
*	Bipolar (Biomet)	6.6 (3.0, 14.2)	8.2 (4.0, 16.6)	8.2 (4.0, 16.6)	8.2 (4.0, 16.6)	
Omnifit	UHR	4.3 (2.5, 7.5)	4.8 (2.8, 8.2)	4.8 (2.8, 8.2)	5.6 (3.3, 9.5)	5.6 (3.3, 9.5)

Table HP36: Yearly Usage of individual Primary Bipolar Prostheses that have been identified as having a higher than anticipated revision rate

Femoral Component	*Bipolar Component*	*Year of Implant*							
		1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
*	Bipolar Type (Biomet)	1	3	6	16	19	20	16	16
Omnifit	UHR	5	25	47	68	59	42	31	23

Primary Total Hip Replacement

This report is based on the analysis of 113,327 primary total hip replacement procedures. This is an increase of 21,117 primary total hip replacements compared to last year's annual report. In this category of hip replacement there are 104,234 primary conventional total hips, 8,945 resurfacing and 148 thrust plate procedures (Table HG1).

Usage

Primary total hips are largely used in the treatment of chronic joint disease in particular arthritis, with osteoarthritis being the most common diagnosis (88.7%). Of the remaining diagnoses, avascular necrosis (3.8%) and fractured neck of femur (2.8%) are the most common (refer 2007 Supplementary Report www.aoa.org.au)

Conventional total hip is by far the most common type of primary total hip replacement. This procedure accounts for 92.0% of all primary total hips recorded by the Registry. The other types of primary total hip are resurfacing procedures (7.9%) and thrust plate procedures (0.1%) (Table HG1). The Registry has recorded only a small number of thrust plate procedures and consequently does not make any further comment on these procedures. The outcome data is however listed in the Tables HG1-HG5 and the 2007 Supplementary Report, www.aoa.org.au.

In recent years a small decline in the use of conventional hips as a proportion of all primary total hip procedures has been reported. This was due to the increasing use of resurfacing procedures which had increased from 5.6% of all primary total hips in 2001 to 8.9% in 2005. In 2006 the use of resurfacing procedures as a proportion of all primary total hip replacements has declined for the first time to 8.2% (Figure HT1).

There is considerable regional variability in the use of resurfacing procedures. In 2006 the use of resurfacing procedures in the ACT/NT has continued to increase and now accounts for 21.6% of all primary total hip procedures. In all other states the use of resurfacing procedures declined in 2006, with the exception of Tasmania which increased from 2.3% to 2.5% in 2006. Western Australia continues to have a very low rate of resurfacing where it accounts for only 1% of all primary total hip procedures (Figure HT1).

Primary Conventional Total Hip

The Exeter V40 stem remains the most common femoral stem used in primary conventional total hip replacement in Australia. During 2006 it was used in 22.8% of all primary conventional total hip procedures (Table HT2 and Figure HT2).

The Corail stem was the second most used femoral stem in primary conventional hip replacement in 2006. It has increased from the fifth most used stem in 2005. The Alloclassic stem has declined in use ranking third in 2005 to fifth in 2006 (Table HT2 and Figure HT2).

The five most common femoral stems were used in 49.6% of all procedures. The five most common prostheses have increased in use from 2005 where this group made up 46.4% of all primary total hip procedures. In 2006, the next five were used in a further 15.8% and the remaining 88 femoral stems in 34.6% of primary conventional total hips.

There has been little change in the number of different types of femoral stems used in 2006. In 2005 this figure was 97 and in 2006 there were 98 different femoral components used (Table HT2).

The 10 most frequently used cemented and cementless femoral components have been detailed in Tables HT3 and HT4 and Figures HT3 and HT4.

The Trident remains the most frequently used acetabular prosthesis (29.2% of all primary conventional total hip procedures)

(Table HT5 and Figure HT5). The five most common acetabular components were used in 62.5% of all procedures. The next five in a further 16.6% and the remaining 75 in 20.9% of primary conventional total hips undertaken in 2006 (Table HT5).

In 2006 the number of different acetabular prostheses that were used decreased from 89 to 85 compared to 2005 (Table HT5). This decrease has been entirely the result of a decrease in the number of different types of cemented acetabular prostheses used. The number of cementless acetabular prostheses has increased by one. The 10 most frequently used cemented and cementless acetabular components have been detailed in Tables HT6 and HT7 and Figures HT6 and 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 2006 twelve different types of resurfacing prostheses were used however there has been a decline in the absolute number of resurfacing procedures undertaken in this year. Although the BHR remains by far the most used prosthesis (55.9% of all resurfacings in 2006), the proportion of resurfacing procedures using this prosthesis has declined from 63.4% in 2005. There are only three other resurfacing prostheses for which the Registry has recorded more than 100 procedures in 2006; ASR, Durom and Adept. Of these only the Adept has increased in use during 2006 (Table HT8 and Figure HT8).

Changes in use with Gender and Age

As has been reported by the Registry previously there are gender and age differences when comparing primary conventional total hip and resurfacing procedures. Resurfacing procedures are undertaken more frequently in men and younger patients than primary conventional total hip replacements. Primary conventional total hips are used more commonly in women (55.9% in 2006) and 66.0% are undertaken in individuals 65 years or older (Table HT9 and Table HT11). Resurfacing procedures are used most often in men (74.1% in 2006) and 90.7% of procedures are undertaken in individuals younger than 65 years. During 2006 there has been a slight increase in use of resurfacing in males and a decrease in all age groups older than 55 years (Table HT10 and Table HT12).

Fixation

In 2006 Cementless primary conventional total hips (59.4%) are used more often than hybrid (31.5%) and cemented procedures (9.2%) (Figure HT8). As has previously been reported there has been considerable change in the approach to fixation of primary conventional total hip replacements. In recent years there has been increasing use of cementless fixation and decreasing use of hybrid and cemented fixation. These trends continued in 2006 with the exception of the ACT and Tasmania, which showed a small decrease in its use since 2005. (Figure HT9).

It is the most frequently used approach to fixation in all states and territories There is however regional variation in the proportion of cementless fixation used. In 2006 this ranged from 86.3% in Tasmania to 40.9% in Queensland (Figure HT9).

Resurfacing hips are nearly all hybrid fixation (95.8% in 2006) but a small number of cementless resurfacing procedures have been undertaken (data not shown).

Outcomes Primary Total Hip Replacement (Osteoarthritis only)

Resurfacing procedures are revised more often than conventional total hips, (hazard ratio (adjusted for age and sex) resurfacing v conventional =1.430; 95%CI (1.219, 1.678) P<0.0001). At five years the cumulative percentage revision of resurfacing procedures is 3.8% compared to 2.8% for all conventional primary hips (Table HT13, Table HT14 and Figure HT10).

Age and Gender (Conventional total hip)

In the first six years after primary conventional total hip replacement there is

no statistical difference in the revision rate with respect to age. At five years the cumulative percent revised for each of the age groups is 3.1% for less than 55 years, 3.0% for 55-64 years and 2.7% for both 65-74 years and 75 years or older (Table HT15, Table HT16 and Figure HT11).

There is no significant difference in outcome of primary conventional total hip with respect to gender, however there does appear to be an effect of age within gender. (Table HT17, Table HT18, and Figure HT12).

Females under 55 years of age have a significantly higher revision rate than females who are 75 years or older (hazard ratio) <55 v >=75 = 1.318; 95%CI (1.050, 1.653) P=0.017). The previously mentioned higher earlier revision rate for the 75 year or older age group is only evident in females in the first 12 months. At five years the cumulative percent revised for females decreases with increasing age; less than 55 years is 3.6%, 55-64 years is 3.4%, 65-74 years is 2.6%, 75 years or older is 2.4% (Table HT19 and Table HT20, Figure HT13).

In males the age and gender interaction differs. Males over 75 years have a higher rate of revision than males younger than 75 years of age. Males over 75 years have a significantly higher rate of revision than males aged between 65 and 74 years of age (hazard ratio >=75 v 65-74 = 2.237; 95% CI (1.964, 2.609) P=0.0153). There is no difference in the revision rate for the three younger age groups. At five years the cumulative revision is the same for males younger than 75 years of age and is lower than the cumulative percent revised for males 75 years or older (Males less than 55 years is 2.6%, 55-64 years and 65-74 years is 2.7% and 75 years or older is 3.1%) (Table HT19, Table HT20 and Figure HT14).

Age and Gender (Resurfacing)

The revision rate of resurfacing hip replacement varies significantly with age. At five years the cumulative percent revised for individuals aged less than 55 years is 2.8% and 55-64 years is 4.5%. The Registry has insufficient data to provide five year rates for the two older age groups (65-74 years and 75 years and older) but at four years these are 4.6% and 9.7% respectively (Table HT21, Table HT22 and Figure HT15).

There is also a significant gender difference in the revision rate of resurfacing procedures with females having a significantly higher rate of revision than males. At three years the cumulative percent revised for females is twice that of males and at five years the difference is almost 3 fold (7.0% females and 2.5% males) (Table HT23, Table HT24 and Figure HT16).

As the number of procedures in the older age groups is less in resurfacing procedures compared to conventional hip replacement the Registry has combined the 65-74 and 75 years or older age groups to undertake the combined gender and age analysis. There are three groups used for this analysis, they are those less than 55, 55-64 and 65 years or older.

Both genders demonstrate an increased revision rate with age. Males have a lower rate of revision than females in each of the three age groups. The age related increase in revision rate is more evident in females.

For females there is a significant difference in revision rates for those aged less than 55 years compared to 55-64 years. The cumulative percent revised at four years for females less than 55 years is 3.9%, 55-64 years is 6.3% and 65 years or older is 11.2% (Tables HT25, HT26 and Figure HT17).

For males there is no difference in the revision rate of those aged less than 55 years compared to 55-64 years. There is however a significantly higher rate of revision if males are 65 years or older. . The cumulative percent revised at four years for males less than 55 years is 1.9%, 55-64 years is 2.2% and 65 years or older is 4.0% (Tables HT25, HT26 and Figure HT18).

Fixation

Cementless primary conventional hip replacement has a higher revision rate than cemented and hybrid hip replacement and this difference varies with age.

Comparing all cementless procedures to either all cemented or all hybrid procedures there is a significant difference; (hazard ratio (adjusted for age and sex) cementless v cemented = 1.501; 95% CI (1.285, 1.753) P<0.0001); cementless v hybrid = 1.445; 95% CI (1.293, 1.614) P<0.0001)) (Table HT27 and Figure HT19).

There is no difference between hybrid and cemented procedures (hazard ratio (adjusted for age and sex); hybrid v cemented = 1.039; 95% CI (0.883, 1.223) P=0.6433) (Table HT27 and Figure HT19)

At five years the cumulative percentage revision rate for hybrid primary conventional hips is 2.3%, cemented is 2.5% and cementless hips is 3.2% (Table HT28).

Within each age category the effect of fixation on the rate of revision was investigated. In those aged less than 55 years there is no significant difference between cementless, cemented and hybrid fixation (Table HT29 and Figure HT20).

In those aged between 55 and 64 years, hybrid fixation has a significantly lower revision rate than cementless fixation (P=0.003). There is no difference between cementless and cement fixation. The survivorship curve for cemented prostheses appears to be increasing at a faster rate than for cementless and hybrid fixation in this age group (Table HT29 and Figure HT21).

In those aged 65 years or older, cementless fixation has a significantly higher rate of revision than both cement and hybrid fixation. The difference between cementless and cemented or hybrid fixation is greatest in the 75 year or older age group where the risk of revision is over two times greater than cemented and 1.75 times greater than hybrid fixation. (Table HT29 and Figure HT22 and Figure HT23).

The yearly cumulative percentage from one to five years for cementless fixation is greater than hybrid fixation for every year and every age group. It is also higher than cement fixation for every year and every age group with the exception of 55-64 year age group where it is the same at three and four years and at five years cement fixation has a higher rate than cementless fixation (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 as so many combinations have been used, many in small numbers of patients 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 71 of the possible 1,121 combinations for conventional primary total hip replacement. This is an additional 84 stem/acetabular prostheses combinations compared to last year's annual report. Although the number of combinations listed in the relevant tables is a small number of the possible combinations these 71 represent 79.3% of all primary conventional total hip procedures.

These tables permit a comparison of the revision rates for each of the identified combinations. 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.

There are 12 cemented primary conventional total hip stem/acetabular combinations listed. The number of revisions per 100 observed component years varies from 0.2 to 0.9. Ten of these combinations have over 1,000 observed component years and of these the three least revised are the MS 30/Low Profile, the Elite Plus/Charnley Ogee and the Exeter/Exeter combinations (0.2, 0.3 and 0.4 revisions per 100 observed component years respectively). These combinations also have the lowest revision rates at five years compared to the other combinations with more than 1,000 observed component years (0.9%, 1.1% and 2.1% respectively (Table HT31 and Table HT32).

There are 37 cementless primary conventional total hip stem/acetabular combinations listed. In this group the number of revisions per 100 observed component years varies from 0.5 to 2.0.. There are 29 combinations with over 1,000 observed component years. Two of these have 0.5 revisions per 100 observed component years. These are the Citation/Vitalock and the Natural Hip/Fitmore combinations. At five years these two combinations also have the lowest cumulative percent revised (2.2% and 1.7% respectively) (Table HT33 and Table HT34).

The range of revisions per 100 observed component years for the 22 hybrid fixation combinations listed varies from 0.1 to 2.2 (Table HT35). There are 19 combinations with over 1,000 observed component years. The three least revised combinations are the Definition/Vitalock, the MS 30/Fitmore and the Exeter/Mallory Head (0.1, 0.2 and 0.3 revisions per 100 observed component years respectively). These three combinations also have the lowest cumulative percent revised at five years (0.8%, 1.4% and 1.5% respectively) (Table HT35 and Table HT36).

Resurfacing Hips

As there is only a small number of resurfacing prostheses, all the prostheses that the Registry has data on to the 31st December 2006, have been listed. In this list the Registry has separately identified the three Comet femoral components used. This has been done as there is some variability in the risk of revision for these three prostheses.

There is also a large amount of variation in the frequency of revision of the other different resurfacing prostheses. Care must be taken in the interpretation of these results however as some of the prostheses have been used in very small numbers and/or only for a short period of time.

There are only four prostheses that have cumulative percent revisions longer than two years. Of these the BHR is the least revised (3.7%). (Tables HT37 and HT38).

Individual Conventional Hip Prostheses with a Higher than anticipated revision rate

The extensive mixing and matching of femoral and acetabular prostheses presents some difficulty in identifying those prostheses that have a higher than anticipated rate of revision. A 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 be dependent on a particular combination of components. The Registry is able to identify stem/acetabular combinations as well as individual femoral and acetabular components that have a higher than anticipated revision rate. When an individual component is identified it is because it has a higher than anticipated revision rate independent of any component it is combined with.

The combinations and individual femoral and acetabular prostheses identified as having a higher than anticipated rate of revision are listed in Table HT39, Table HT40 and Table HT41.

A number of prostheses identified in the last annual report have not been identified in this report. They are the Alloclassic/Fitmore and Esop/Atlas

combinations and the EPF-Plus and Lineage cementless acetabular prostheses. The Delta cementless acetabular prostheses was identified as an individual component last year, this year however it is only identified in combination with the F2L Multineck cementless stem.

The Alloclassic/Fitmore combination was reported last year as having 2.3 revisions per 100 observed component years (hazard ratio= 2.16, 95% CI (1.2, 3.4) P=0.004). This analysis did not include the Alloclassic SL stems. The stems differ in the degree of offset but are otherwise identical. This year we have combined the two stems as a single "Alloclassic" stem analysis. This has increased the number of procedures in this group and as a result the number of revisions per 100 observed component years has declined to 1.2. The Alloclassic stem is not significantly different than other cementless prostheses. The cumulative percent revision of this combination at four years is 3.7% compared to other cementless primary total hip replacements of 3.1% (data not shown).

In the 2006 Annual Report Esop/Atlas combination was identified as having 4.2 revisions per 100 observed component years (hazard ratio= 2.93, 95% CI (0.1, 8.2) P=0.02). This was based on a small number of revisions for 81 procedures. In 2006 a further 37 procedures but no additional revisions were reported to the Registry. The number of revisions per 100 observed component years has declined to 2.1. This is no longer significantly different from other cementless primary total hip replacements.

Last year the EPF-Plus was identified as having 2.1 revisions per 100 observed component years (hazard ratio=2.00, 95% CI (0.9, 3.3) P=0.02). This was based on the analysis of 560 procedures. In 2006 there were an additional 402 procedures using this prosthesis two of which were revised. The reduction in the rate of revision appears to be related to a change of practice in the use of this prosthesis. The major reason for the high revision rate reported last year were revisions due to dislocation. In 2006 there was an increased use of larger head sizes particularly 32mm and 36mm heads. As a consequence there has been a decline in revision for dislocation and the EPF-Plus is no longer significantly different from other cementless prostheses.

The Lineage cementless acetabular prosthesis is the last of the prostheses identified last year but not this year. Analysis of the 332 procedures using this prosthesis reported to the Registry by the end of 2006 still identifies the Lineage as having a higher than anticipated rate of revision (hazard ratio=2.61, 95% CI (1.7, 4.1) P<0.001). More detailed analysis of the different stems it has been used with however indicate that most of the procedures have been undertaken with either the Margron or the Profemur Z stem. Both of these stems have been individually identified as having a higher than anticipated revision rate (see below). There has also been increased use of the Lineage acetabular prosthesis with different stems. Of the 134 procedures reported to the Registry using the Lineage with other stems, only one of those procedures has been revised. As a consequence the Lineage cementless acetabular prosthesis has not been individually identified in this year's report as having a higher than anticipated rate of revision.

When considering the prostheses identified in the three different fixation categories, the largest number of prostheses are identified in the cementless category (one stem/acetabular combination, three femoral stems and four acetabular components). In the cemented category there are three stem/acetabular combinations and in the hybrid fixation category there are two cups and one stem/acetabular combination. Two of the cementless acetabular prostheses are identified in both the cementless and hybrid groups.

In the cementless primary total hip category the one stem/acetabular prosthesis combination identified is the F2L Multineck/Delta combination. Last

year's report identified the Delta cementless acetabular prosthesis as having a higher than anticipated rate of revision with 5.0 revisions per 100 observed component years (hazard ratio= 4.78, 95% CI (0.1, 10.0) P=0.011). This year the Delta cementless acetabular prosthesis has again been identified by the algorithm as having a higher than anticipated rate of revision with 3.1 revisions per 100 observed component years (hazard ratio =2.02, 95% CI (1.0, 4.0) P=0.047). More detailed analysis of the stems used with this acetabular prosthesis indicate that 6 of the 8 revisions reported for this prosthesis have occurred in combination with the one stem, the F2L Multineck. There have been 6 revisions from 99 procedures using this combination and 4.8 revisions per 100 component years (hazard ratio =3.30, 95% CI (1.5, 7.3) P=0.004) (Table HT39). The Registry has only a short follow up on the procedures using this combination and at one year the cumulative percent revised is 6.64% (Table HT40 and Figure HT29). The Registry has information on 731 procedures involving the F2L Multineck stem. The acetabular prosthesis that it has been most frequently used with is the SPH Blind cementless acetabular prosthesis (611 procedures). The SPH Blind is known to have a higher than anticipated rate of revision (see below). This combination however has 1.4 revisions per 100 observed component years and although higher than the rate of revision of other cementless prostheses is not sufficiently high to be identified by the Registry algorithm. This stem has been used with a number of other cementless acetabular prostheses however the number of these procedures is small (21). The F2L Multineck stem has not been identified individually as a prosthesis with a higher than anticipated rate of revision.

The three individual cementless stems with a higher than anticipated rate of revision that have been identified by the Registry this year are the Margron, Profemur Z and the Revitan stems (Table HT39 and Table HT40). The Registry has recorded use of each of these three prostheses in 2006 (Table HT41).

The Margron cementless femoral stem has been identified for a number of years by the Registry as having a higher than anticipated rate of revision. The most recent data demonstrates that the risk of revision is three times greater than other cementless stems. There are 2.7 revisions per 100 observed component years (hazard ratio= 3.07, 95% CI (2.3, 4.1) P<0.001) (Table HT39). At five years the cumulative percent revision of the Margron is 10.6% (Table HT40).

The Profemur Z was first identified in last year's annual report. At that time it was identified simply as the "Profemur" stem. There is however a range of different "Profemur" stems. The revisions reported last year were only for the Profemur Z as the Registry at that time had not recorded any significant use of other "Profemur" stems. This year because other stems from the "Profemur" range have now been recorded it is necessary to distinguish the Profemur Z from the other stems in the "Profemur" range. The Registry only has two years of data on this prosthesis. The risk of revision at this early stage however is over three and half times that of other cementless stems. There are 5.0 revisions per 100 observed component years (hazard ratio= 3.66, 95% CI (2.1, 6.5) P<0.001) (Table HT39). At two years the cumulative percent revision for the Profemur Z is 8.66% (Table HT40).

The Revitan femoral stem was also identified in last year's annual report. It has only been used in small numbers and only three prostheses have been used in the last two years. The risk of revision of this prosthesis is two and a half times that of other cementless femoral stems (hazard ratio = 2.56; 95% CI (1.4, 5.7) P=0.022) (Table HT39). At three years the cumulative percent revision for the Revitan is 7.16% (Table HT40).

The four cementless acetabular prostheses identified by the Registry as having a higher than anticipated rate of revision are the Artek, Inter-Op, MBA and the SPH Blind cementless acetabular prosthesis (Table HT39). Of these prostheses the Registry has not recorded any use of the

Artek since 2002 and the Inter-Op since 2001. The other two cementless acetabular prostheses (MBA and SPH Blind) were used in 2006 (Table HT41).

The Artek has over five times the risk of revision compared to other cementless prostheses. There have been 3.5 revisions per 100 observed component years (hazard ratio= 5.07; 95% CI (3.5, 7.4) P<0.001). (Table HT39) The cumulative percent revision for the Artek at five years is 15.1% (Table HT40).

The Inter-Op cementless acetabular prosthesis has almost six times greater risk of revision compared to other cementless procedures. There are 4.6 revisions per 100 observed component years (hazard ratio= 5.82; 95% CI (2.6, 13.0) P<0.001). (Table HT39) The cumulative percent revision for the Inter-Op at five years is 22.6% (Table HT40).

The remaining cementless acetabular prostheses are the SPH-Blind and the MBA. The SPH-Blind has been identified by the Registry for a number of years as having a higher than anticipated revision rate. When used with cementless stems it has twice the risk of revision compared to other cementless procedures. There are 1.7 revisions per 100 observed component years (hazard ratio=2.00; 95% CI (1.5, 2.7) P<0.001). (Table HT39). The cumulative percent revision at five years is 6.61% (Table HT40). The SPH-Blind is also individually identified as having a higher than anticipated rate of revision when combined with cemented stems. In the hybrid group when the SPH-Blind cementless acetabular prosthesis is used there are 1.7 revisions per 100 observed component years (hazard ratio=2.26; 95% CI (1.2, 4.4) P=0.015) (Table HT39). The five year cumulative percent revision of hybrid procedures using the SPH-Blind is 6.03% (Table HT40)

The MBA cementless acetabular prosthesis is being identified for the first time. As was the case with the SPH-Blind, this prosthesis has been individually identified as having a higher than anticipated rate of revision in both cementless and hybrid primary total hips. The Registry has received data on only a small numbers of procedures in both categories using the MBA and only 7 new procedures in 2006, all with cemented stems (Table HT41). When used with cementless stems it has just over two and a half times the risk of revision compared to other cementless procedures with 2.5 revisions per 100 observed component years (hazard ratio=2.87; 95% CI (1.3, 6.4) P=0.01) (Table HT39). The cumulative percent revised at four years is 7.9% (Table HT40). When used with cemented stems it has five and a half times the risk of revision compared to other cemented procedures with 4.8 revision per 100 observed component years (hazard ratio=5.43; 95% CI (2.3, 13.1) P<0.001) (Table HT39). The three year cumulative percent revised when used with cemented stems is 13.3% (Table HT40).

Three cemented stem/cemented acetabular combinations have been identified as having a higher than anticipated rate of revision. They are the Elite Plus/Apollo, the Elite Plus/Charnley LPW and the H Moos/Mueller. All three combinations were also identified in last year's annual report.

The Registry has recorded 820 procedures with 16 different cemented acetabular prostheses using the Elite Plus stem. When all these procedures are combined there have been 0.8 revisions per 100 observed component years. It is only when the Elite Plus stem is used with either the Apollo or the Charnley LPW cemented acetabular prostheses that the revision rate is higher than anticipated. The Registry has data on a small number of procedures when these combinations are used (52 with the Apollo and 89 with the Charnley LPW) and no recorded use of either of these combinations since 2003 (Table HT41).

The Elite Plus/Apollo combination has well over four and half times the risk of revision compared to other cemented primary hips with 3.0 revisions per 100 observed component years (hazard ratio=4.72; 95% CI (2.3, 10.0) P<0.001) (Table HT39). The five year cumulative

percent revision is 15.1% (Table HT40).

The Elite Plus/Charnley LPW has almost three and half times the risk of revision compared to other cemented primary hips with 2.4 revisions per 100 observed component years (hazard ratio=3.46; 95% CI (1.8, 6.7) P<0.001) (Table HT39). The five year cumulative percent revised is 9.96% (Table HT40).

There are also a small number of procedures recorded by the Registry for the H Moos/Mueller combination (19) and no recorded use since 2002. This combination has over 13 and a half times the risk of revision compared to other cemented prostheses with 9.2 revisions per 100 observed component years (hazard ratio=13.7; 95% CI (6.5, 29.1) P<0.001) (Table HT39). The five year cumulative percent revised is 38.9% (Table HT40).

In the hybrid primary total hip category there is one stem/acetabular prosthesis combination and two individual cementless acetabular prostheses both of which have already been discussed.

The hybrid combination identified for the first time as having a higher than anticipated rate of revision is the C-Stem/Pinnacle combination. The Registry has two years of data on the use of this combination and it is just statistically significance. It has twice the risk of revision compared to other hybrid primary total hips with 2.2 revision per 100 observed component years (hazard ratio=2.06; 95% CI (1.0, 4.1) P=0.042) (Table HT39). The two year cumulative percent revised is 3.67% (Table HT40). The Registry has data on 1,558 procedures where the C-Stem is used with 15 different cementless acetabular prostheses. Overall there are 1.1 revisions per 100 observed component years. This is similar to other hybrid combinations. The Registry has data on almost 750 procedures where the Pinnacle cementless acetabular prosthesis has been used with 13 different cemented stems. Overall the number of revisions per 100 observed component years is also 1.1.

Cumulative percentage revision graphs have been provided for all identified prostheses and prostheses combinations where there has been greater than 100 procedures recorded by the Registry (Figures HT24-30).

Individual Resurfacing prostheses with a Higher than anticipated revision rate

There are difficulties in determining which resurfacing prostheses have a higher than anticipated rate of revision. These include the dominance in use of the BHR and that the majority of additional resurfacing prostheses have only been used in relatively small numbers and for a much shorter time than BHR.

Using the Registry algorithm the ASR and the Durom were identified as having a higher than anticipated rate of revision. Both of these prostheses have over 500 procedures recorded by the Registry.

The ASR has twice the risk of revision compared to all other resurfacing procedures with 3.0 revision per 100 observed component years (hazard ratio=2.18, 95% CI (1.5, 3.2) P<0.001) (Table HT42). The cumulative percent revision at two years for the ASR is 5.16% (Table HT43 and Figure HT31).

The Durom also has twice the risk of revision compared to other resurfacing procedures with 2.7 revisions per 100 observed component years (hazard ratio=2.18, 95% CI (1.4, 3.3) P<0.001) (Table HT42). The cumulative percent revision at two years for the Durom is 5.01% (Table HT43 and Figure HT32).

In the last annual report the Cormet 2000 was identified as a resurfacing prostheses with a higher than anticipated revision rate. This analysis contained three different femoral prostheses, the Cormet, the Cormet HAP2000 and the Cormet Bi-Coated. Of these three the Cormet Bi-Coated has commenced use recently and the Registry has only one year's data for this prosthesis. In the analysis undertaken for this report, when all three Cormet prostheses are combined there is no significant difference in the risk of revision compared to other resurfacing

prostheses. This is because of the lower early revision rate of the Cormet Bi-Coated. When the analysis is undertaken differentiating the different Cormet prostheses the Cormet 2000HAP has a significantly higher rate of revision compared to other resurfacing prostheses.
This prosthesis has three times the risk of revision compared to other resurfacing procedures with 2.8 revisions per 100 observed component years (hazard ratio=3.01, 95% CI (1.5, 6.1) P=0.002) (Table HT42). The cumulative percent revision at four years for the Cormet 2000HAP is 9.18% (Table HT44 and Figure HT33).

Primary Total Hip Replacement - 1/9/1999 to 31/12/2006

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	68	2.6	1510	57.5	712	27.1	336	12.8	.	.	2626	100.0
NSW	1468	4.5	18954	58.4	9361	28.8	2680	8.3	11	0.0	32474	100.0
QLD	5099	28.4	5150	28.6	6372	35.4	1360	7.6	.	.	17981	100.0
SA	2137	17.5	4391	36.0	4847	39.7	834	6.8	.	.	12209	100.0
TAS	357	9.0	3194	80.2	364	9.1	57	1.4	10	0.3	3982	100.0
VIC	4264	13.4	14195	44.7	9878	31.1	3417	10.8	1	0.0	31755	100.0
WA	873	7.1	7024	57.1	4016	32.7	261	2.1	126	1.0	12300	100.0
Australia	**14266**	**12.6**	**54418**	**48.0**	**35550**	**31.4**	**8945**	**7.9**	**148**	**0.1**	**113327**	**100.0**

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

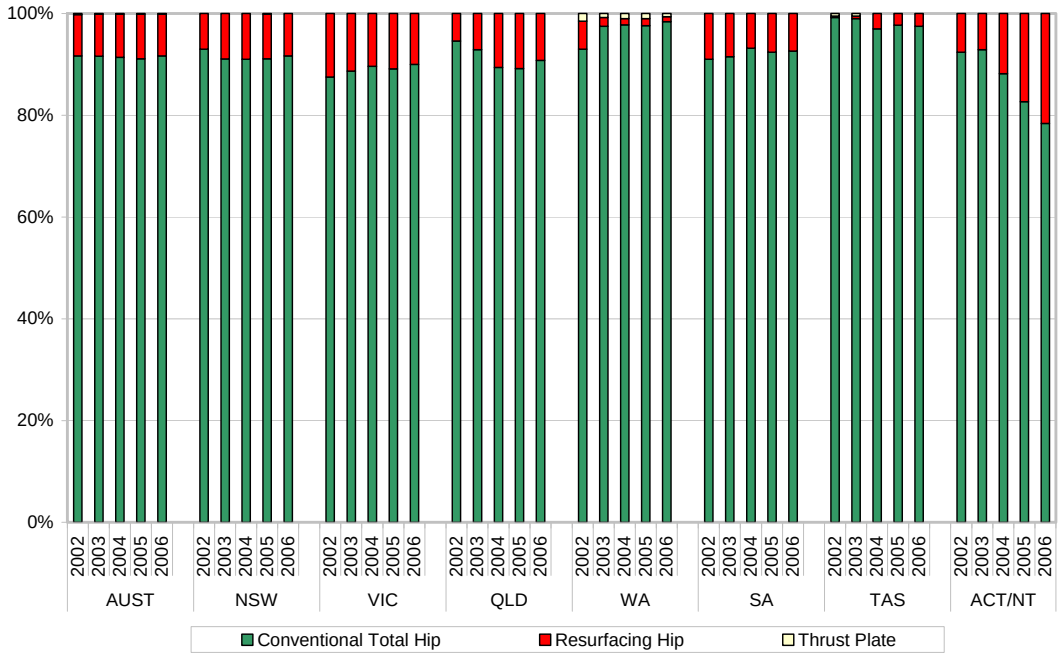


Table HT2: 10 Most common Femoral components used in Primary Conventional Total Hips

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Exeter V40 (3226)	Exeter V40 (3898)	Exeter V40 (4186)	Exeter V40 (4391)	Exeter V40 (4383)
2	ABGII (1069)	ABGII (1027)	Synergy (1367)	Synergy (1254)	Corail (1399)
3	Spectron EF (840)	Synergy (997)	Alloclassic (992)	Alloclassic (1215)	Synergy (1380)
4	Elite Plus (751)	VerSys (881)	ABGII (903)	Accolade (941)	Accolade (1324)
5	Synergy (747)	Alloclassic (817)	Spectron EF (802)	Corail (932)	Alloclassic (1052)
6	Alloclassic (705)	Spectron EF (783)	Secur-Fit Plus (762)	ABGII (758)	Spectron EF (783)
7	VerSys (702)	Secur-Fit Plus (711)	VerSys (692)	Spectron EF (719)	Summit (618)
8	Omnifit (688)	Omnifit (618)	Accolade (576)	VerSys (678)	VerSys (582)
9	Secur-Fit Plus (598)	C-Stem (562)	CPT (552)	Secur-Fit Plus (661)	CPT (537)
10	C-Stem (484)	S-Rom (482)	Omnifit (518)	Summit (544)	ABGII (515)
% using 10 most common	62%	63.2%	62.9%	64.3%	65.4%
Total N Procedures	15822	17038	18047	18812	19211
Total N Prosthesis Types	85	79	82	97	98

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

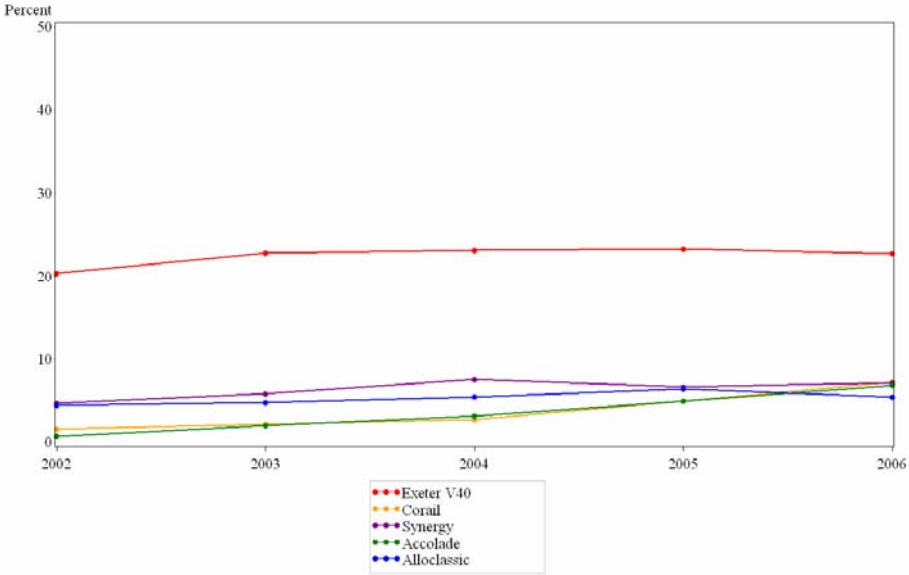


Table HT3: 10 Most common Primary Conventional Total Femoral Components used with Cement Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Exeter V40 (3224)	Exeter V40 (3898)	Exeter V40 (4185)	Exeter V40 (4389)	Exeter V40 (4380)
2	Spectron EF (840)	Spectron EF (783)	Spectron EF (802)	Spectron EF (719)	Spectron EF (783)
3	Elite Plus (751)	C-Stem (562)	CPT (552)	CPT (501)	CPT (537)
4	C-Stem (484)	CPT (476)	C-Stem (454)	C-Stem (375)	CPCS (497)
5	CPT (462)	Elite Plus (444)	CPCS (375)	CPCS (359)	C-Stem (346)
6	Charnley (398)	MS 30 (357)	Elite Plus (351)	MS 30 (297)	MS 30 (256)
7	MS 30 (386)	Omnifit (339)	Omnifit (283)	Elite Plus (248)	Omnifit (162)
8	Exeter (378)	Charnley (320)	MS 30 (276)	Omnifit (223)	Charnley (138)
9	Omnifit (366)	CPCS (243)	Charnley (201)	Charnley (218)	VerSys (109)
10	CPCS (180)	VerSys (144)	VerSys (115)	VerSys (119)	Elite Plus (107)
% using 10 most common	91%	91.8%	92.7%	93.6%	94.6%
Total N Procedures	8207	8240	8167	7880	7713
Total N Prosthesis Types	45	45	39	39	41

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

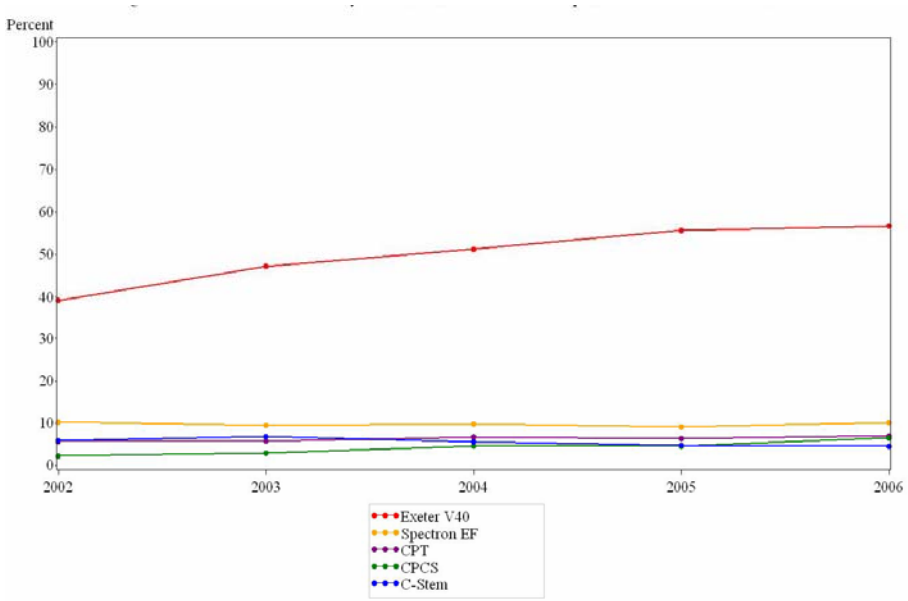


Table HT4: 10 Most common Primary Conventional Total Femoral Components used with Cementless Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	ABGII (1066)	ABGII (1024)	Synergy (1357)	Synergy (1240)	Corail (1398)
2	Synergy (740)	Synergy (976)	Alloclassic (989)	Alloclassic (1215)	Synergy (1374)
3	Alloclassic (705)	Alloclassic (817)	ABGII (903)	Accolade (939)	Accolade (1324)
4	Secur-Fit Plus (597)	VerSys (737)	Secur-Fit Plus (761)	Corail (932)	Alloclassic (1050)
5	VerSys (538)	Secur-Fit Plus (710)	VerSys (577)	ABGII (757)	Summit (617)
6	Secur-Fit (474)	Secur-Fit (482)	Accolade (574)	Secur-Fit Plus (660)	ABGII (515)
7	S-Rom (433)	S-Rom (481)	Corail (495)	VerSys (559)	Secur-Fit (492)
8	Omnifit (322)	Corail (376)	S-Rom (492)	Summit (544)	SL-Plus (474)
9	CLS (258)	Accolade (333)	Secur-Fit (448)	Secur-Fit (503)	VerSys (473)
10	Corail (256)	Mallory-Head (329)	Summit (403)	S-Rom (457)	S-Rom (426)
% using 10 most common	70.8%	71.2%	70.8%	71.4%	70.8%
Total N Procedures	7615	8798	9880	10932	11498
Total N Prosthesis Types	64	57	61	74	77

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

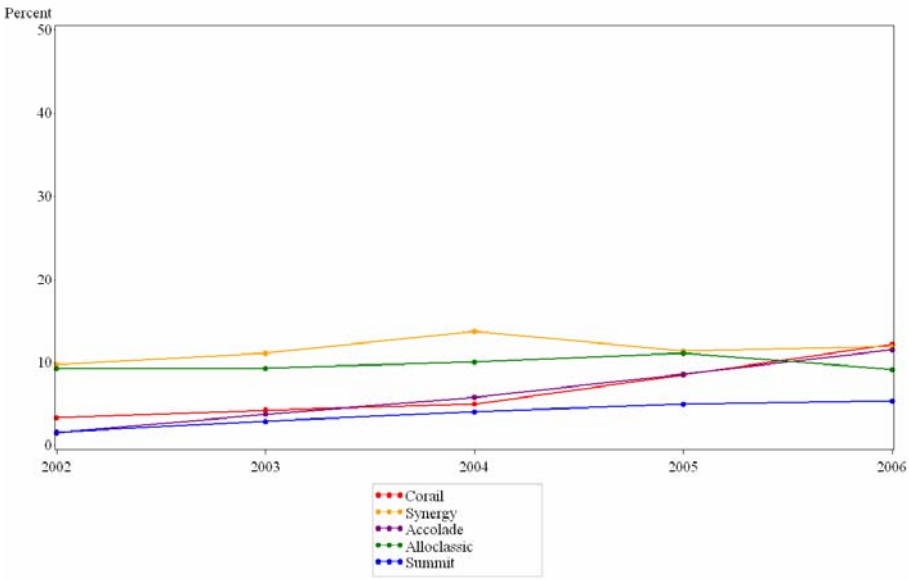


Table HT5: 10 Most common Acetabular components used in Primary Conventional Total Hips

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Trident (2832)	Trident (3981)	Trident (4726)	Trident (5426)	Trident (5616)
2	Reflection (1788)	Reflection (1994)	Reflection (2427)	Reflection (2112)	Reflection (2462)
3	Trilogy (1287)	Trilogy (1519)	Trilogy (1385)	Pinnacle (1381)	Pinnacle (1680)
4	ABGII (1215)	Vitalock (953)	Pinnacle (1084)	Trilogy (1342)	Trilogy (1273)
5	Vitalock (1184)	Duraloc (901)	Allofit (877)	Allofit (953)	Allofit (971)
6	Duraloc (1118)	ABGII (825)	Contemporary (796)	Contemporary (903)	ASR (939)
7	Mallory-Head (719)	Allofit (790)	ABGII (743)	Mallory-Head (643)	Contemporary (886)
8	Contemporary (718)	Contemporary (766)	Duraloc (627)	ASR (573)	BHR (533)
9	Allofit (630)	Mallory-Head (729)	Mallory-Head (597)	Fitmore (495)	Mallory-Head (425)
10	Fitmore (604)	Pinnacle (537)	Fitmore (585)	ABGII (448)	EPF-Plus (406)
% using 10 most common	76.4%	76.3%	76.7%	75.9%	79.1%
Total N Procedures	15822	17038	18047	18812	19211
Total N Prosthesis Types	72	75	72	89	85

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

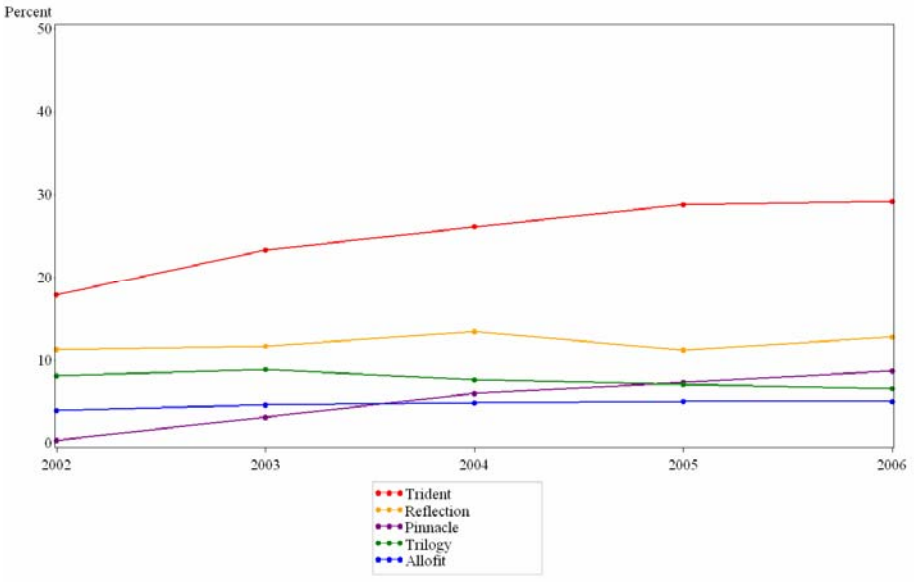


Table HT6: 10 Most common Primary Conventional Total Acetabular Components used with Cement Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Contemporary (718)	Contemporary (766)	Contemporary (796)	Contemporary (903)	Contemporary (885)
2	Reflection (341)	Exeter (256)	Reflection (317)	Reflection (220)	Reflection (226)
3	Exeter (314)	Reflection (256)	Exeter (224)	Exeter (135)	Exeter (132)
4	Charnley Ogee (232)	Charnley Ogee (199)	Charnley Ogee (190)	Charnley Ogee (96)	Elite Plus LPW (86)
5	Charnley (189)	Elite Plus LPW (149)	Elite Plus Ogee (117)	Charnley (74)	Brunswick (76)
6	Elite Plus Ogee (125)	Low Profile Cup (129)	Low Profile Cup (95)	Elite Plus Ogee (70)	CCB (66)
7	Elite Plus LPW (118)	Elite Plus Ogee (109)	ZCA (95)	Low Profile Cup (66)	Charnley Ogee (58)
8	Low Profile Cup (106)	Charnley (102)	Elite Plus LPW (51)	ZCA (66)	ZCA (55)
9	Charnley LPW (88)	ZCA (90)	Brunswick (39)	Elite Plus LPW (65)	Elite Plus Ogee (49)
10	Apollo (81)	Brunswick (63)	Charnley (39)	Brunswick (56)	Charnley (48)
% using 10 most common	87.9%	87%	87.6%	88.6%	90.5%
Total N Procedures	2630	2436	2241	1976	1857
Total N Prosthesis Types	35	42	41	41	34

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

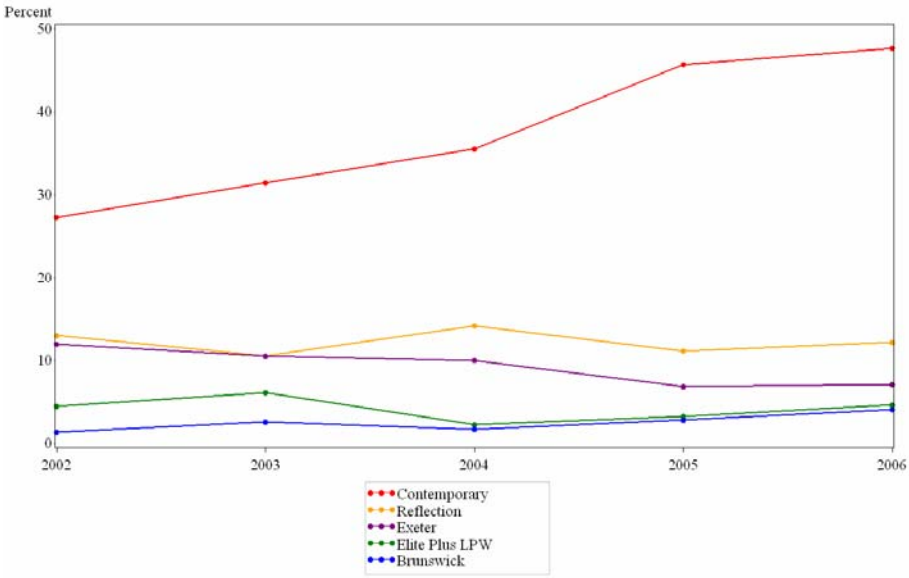


Table HT7: 10 Most common Primary Conventional Total Acetabular Components used with Cementless Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Trident (2821)	Trident (3978)	Trident (4713)	Trident (5412)	Trident (5603)
2	Reflection (1447)	Reflection (1738)	Reflection (2110)	Reflection (1892)	Reflection (2236)
3	Trilogy (1280)	Trilogy (1519)	Trilogy (1383)	Pinnacle (1381)	Pinnacle (1679)
4	ABGII (1215)	Vitalock (952)	Pinnacle (1082)	Trilogy (1341)	Trilogy (1272)
5	Vitalock (1182)	Duraloc (896)	Allofit (875)	Allofit (951)	Allofit (967)
6	Duraloc (1114)	ABGII (824)	ABGII (741)	Mallory-Head (642)	ASR (939)
7	Mallory-Head (714)	Allofit (783)	Duraloc (627)	ASR (572)	BHR (533)
8	Allofit (628)	Mallory-Head (728)	Mallory-Head (596)	Fitmore (491)	Mallory-Head (425)
9	Fitmore (604)	Pinnacle (536)	Fitmore (584)	ABGII (448)	EPF-Plus (406)
10	Option (451)	Fitmore (520)	Vitalock (573)	Duraloc (445)	Durom (320)
% using 10 most common	86.8%	85.4%	84%	80.6%	82.9%
Total N Procedures	13192	14602	15806	16836	17354
Total N Prosthesis Types	48	51	48	61	62

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

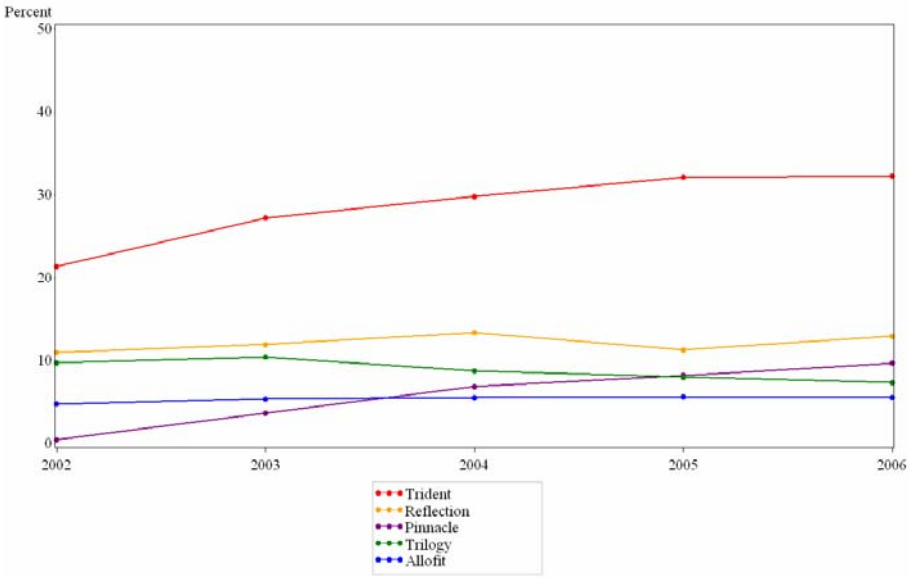


Table HT8: 10 Most Common Resurfacing hip systems used in Primary Resurfacing Hips

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	BHR (1344)	BHR (1353)	BHR (1216)	BHR (1156)	BHR (966)
2	Cormet (42)	Durom (58)	ASR (164)	ASR (298)	ASR (248)
3	Cormet 2000 HAP (17)	ASR (43)	Durom (161)	Durom (205)	Durom (140)
4	Conserve Plus (3)	Cormet (42)	Cormet (47)	Cormet HAP Bi-Coated (67)	Adept (125)
5		Cormet 2000 HAP (38)	Cormet 2000 HAP (39)	Adept (19)	Mitch TRH (94)
6		Conserve Plus (7)	Recap (27)	Cormet (18)	Cormet HAP Bi-Coated (60)
7			Conserve Plus (18)	Icon (18)	Bionik (30)
8			Icon (4)	Conserve Plus (15)	Icon (29)
9			Cormet HAP Bi-Coated (3)	Recap (14)	Cormet (12)
10			Conserve (1)	Bionik (12)	Conserve Plus (11)
% using 10 most common	100%	100%	100%	99.9%	99.2%
Total N Procedures	1406	1541	1680	1824	1728
Total N Prosthesis Types	4	6	10	11	12

Figure HT8: 5 Most common Resurfacing Hip Systems used in Primary Resurfacing Hips

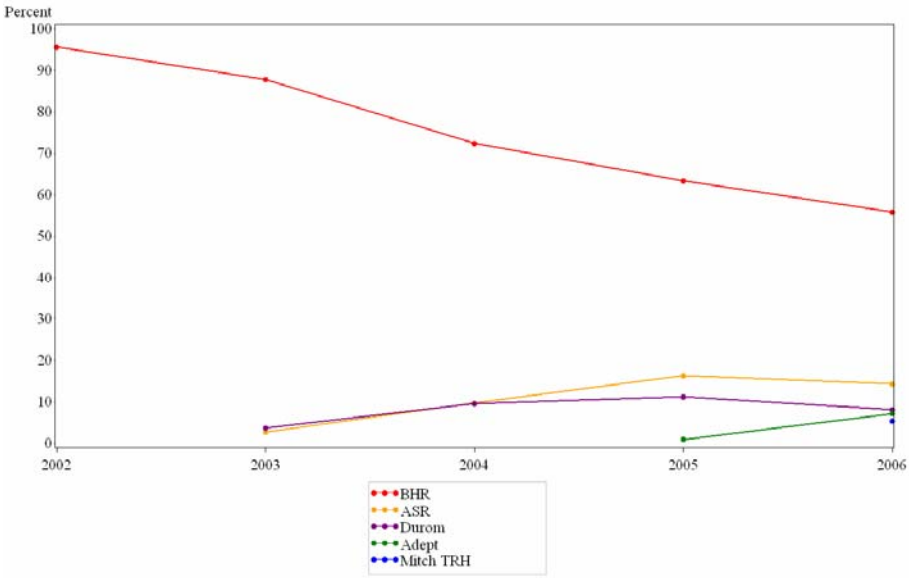


Table HT9: Usage of Primary Conventional Total Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	8702	55.0	7120	45.0	15822	100.0
2003	9511	55.8	7527	44.2	17038	100.0
2004	10101	56.0	7932	44.0	18033	100.0
2005	10492	55.9	8267	44.1	18759	100.0
2006	10700	55.9	8446	44.1	19146	100.0

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

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	436	31.0	970	69.0	1406	100.0
2003	443	28.7	1098	71.3	1541	100.0
2004	469	27.9	1211	72.1	1680	100.0
2005	497	27.2	1327	72.8	1824	100.0
2006	448	25.9	1280	74.1	1728	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*	*%*
2002	1933	12.2	3383	21.4	5540	35.0	4230	26.7	736	4.7	15822	100.0
2003	1988	11.7	3735	21.9	5961	35.0	4545	26.7	809	4.7	17038	100.0
2004	1967	10.9	4089	22.7	6163	34.2	4951	27.5	863	4.8	18033	100.0
2005	2164	11.5	4303	22.9	6350	33.9	5059	27.0	883	4.7	18759	100.0
2006	2209	11.5	4306	22.5	6435	33.6	5205	27.2	991	5.2	19146	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*	*%*
2002	733	52.1	520	37.0	142	10.1	11	0.8	0	0.0	1406	100.0
2003	805	52.2	564	36.6	157	10.2	15	1.0	0	0.0	1541	100.0
2004	851	50.7	668	39.8	151	9.0	10	0.6	0	0.0	1680	100.0
2005	893	49.0	757	41.5	168	9.2	6	0.3	0	0.0	1824	100.0
2006	901	52.1	667	38.6	156	9.0	4	0.2	0	0.0	1728	100.0

Figure HT9: Trends in Prosthesis Fixation - Primary Conventional Total by State and Territory

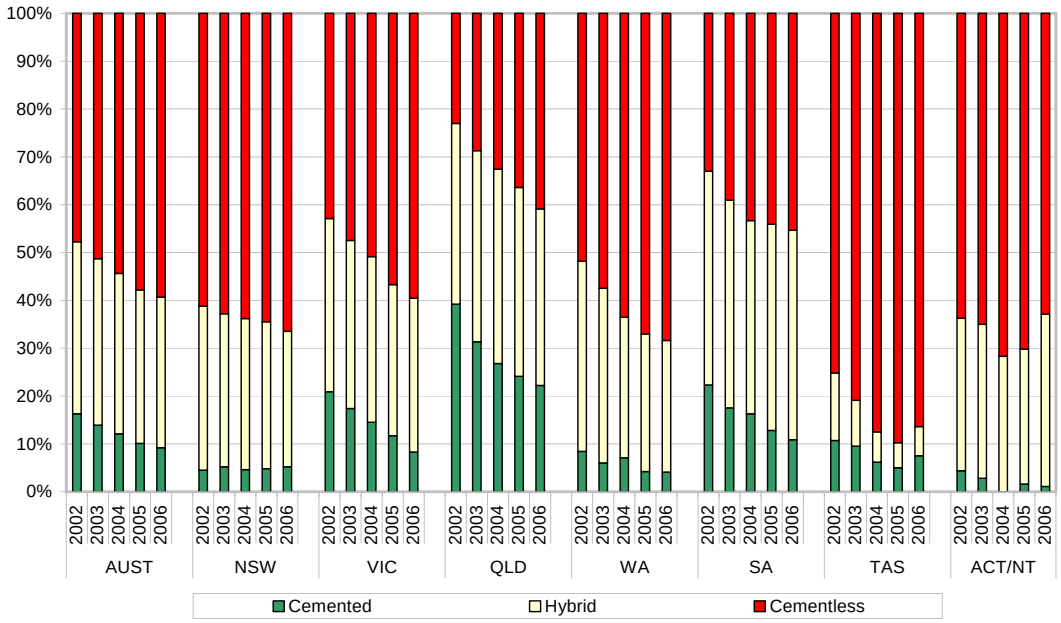
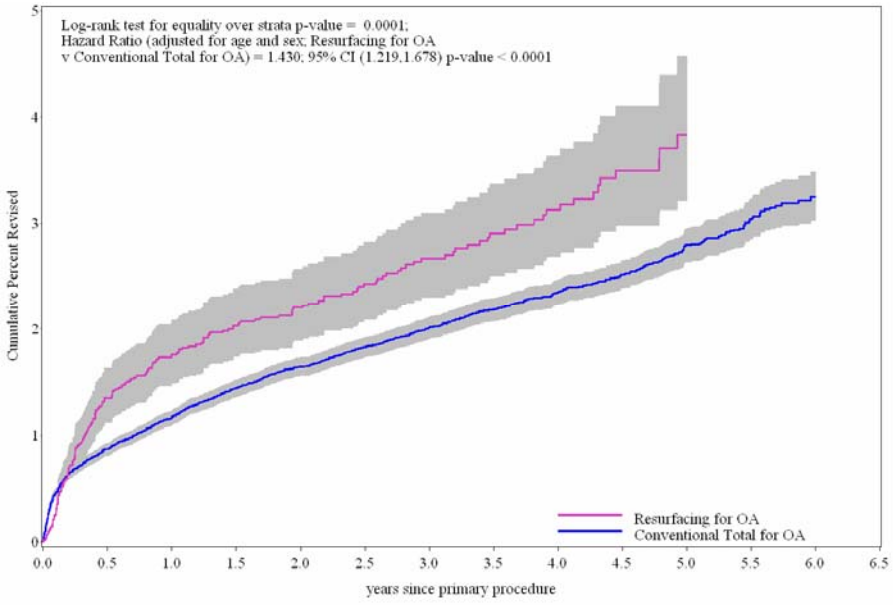


Table HT13: Conventional Total hip and Resurfacing hip requiring revision (primary diagnosis OA excluding revisions for infection)

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	203	8361	2.4	21348	1.0	(0.82, 1.09)
Conventional Total	1724	91693	1.9	250784	0.7	(0.66, 0.72)
Total	**1927**	**100054**	**1.9**	**272132**	**0.7**	**(0.68, 0.74)**

Figure HT10: Cumulative percentage revision of Conventional Total hip and Resurfacing hip (primary diagnosis 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Resurfacing	8361	7414	6580	5686	4838	4034	3307	2605	1919	1261	686	298	84
Conventional Total	91693	81741	72775	64126	55365	47137	39159	31866	24555	17905	11557	6604	2957

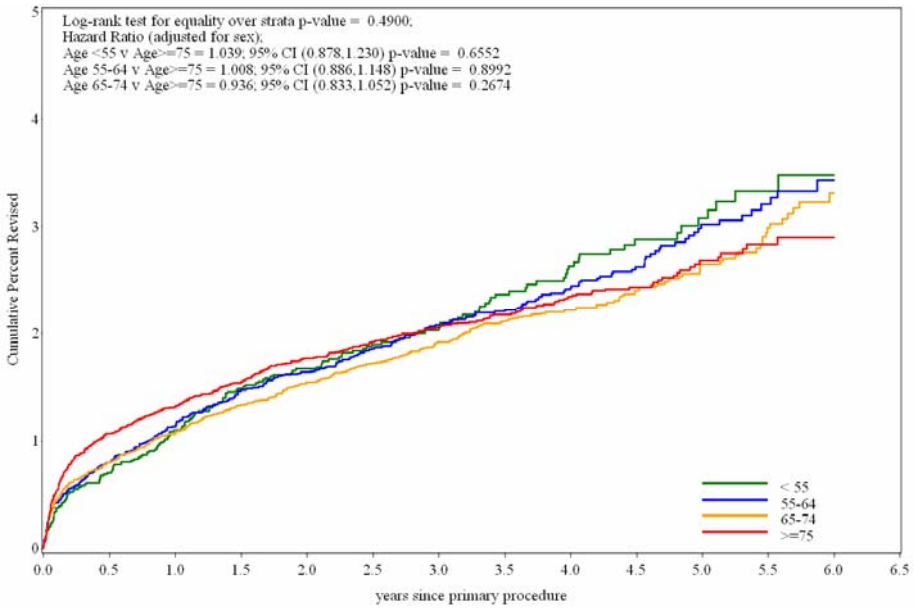
Table HT14: Yearly cumulative percentage revision of Conventional Total and Resurfacing hip (primary diagnosis OA excluding revisions for infection)

Type of Procedure	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Resurfacing	1.8 (1.5, 2.1)	2.2 (1.9, 2.6)	2.7 (2.3, 3.1)	3.1 (2.7, 3.6)	3.8 (3.2, 4.6)
Conventional Total	1.2 (1.1, 1.2)	1.6 (1.6, 1.7)	2.0 (1.9, 2.1)	2.3 (2.2, 2.5)	2.8 (2.6, 3.0)

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*
< 55	183	9056	2.0	25561	0.7	(0.62, 0.83)
55-65	404	20785	1.9	57598	0.7	(0.63, 0.77)
65-74	595	32879	1.8	91439	0.7	(0.60, 0.71)
>= 75	542	28973	1.9	76186	0.7	(0.65, 0.77)
Total	**1724**	**91693**	**1.9**	**250784**	**0.7**	**(0.66, 0.72)**

Figure HT11: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<55	9056	8088	7222	6376	5563	4808	4098	3358	2687	1985	1308	721	363
55-64	20785	18571	16638	14651	12655	10824	8970	7349	5679	4260	2784	1620	758
65-74	32879	29519	26327	23316	20230	17314	14455	11795	9076	6600	4240	2466	1086
>=75	28973	25563	22588	19783	16917	14191	11636	9364	7113	5060	3225	1797	750

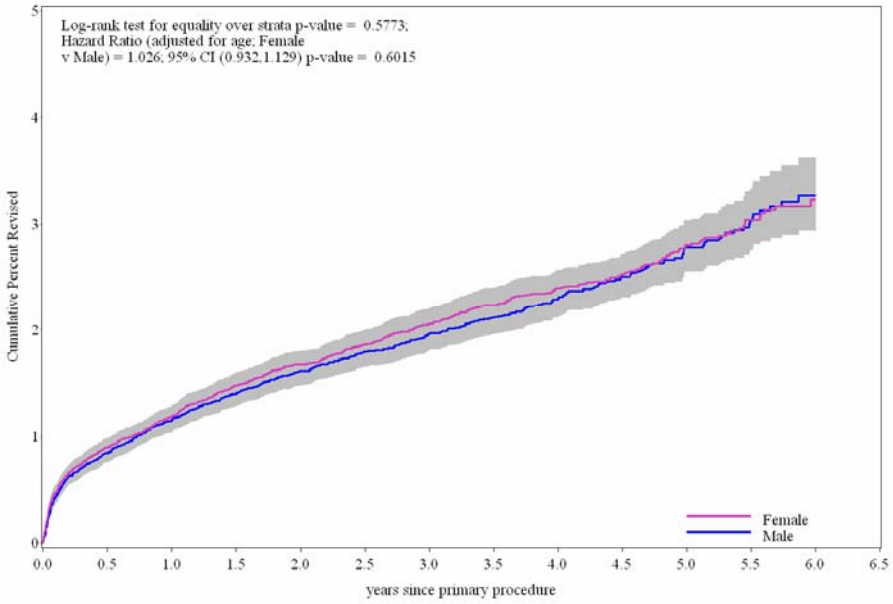
Table HT16: Yearly cumulative percentage revision of Primary Conventional Total Hip Procedures by Age (primary diagnosis OA excluding infection)

Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
<55	1.1 (0.9, 1.3)	1.7 (1.4, 2.0)	2.1 (1.7, 2.4)	2.6 (2.2, 3.1)	3.1 (2.6, 3.6)
55-64	1.1 (1.0, 1.3)	1.6 (1.5, 1.8)	2.1 (1.9, 2.3)	2.4 (2.2, 2.7)	3.0 (2.7, 3.4)
65-74	1.1 (1.0, 1.2)	1.5 (1.4, 1.7)	1.9 (1.8, 2.1)	2.2 (2.0, 2.4)	2.7 (2.4, 2.9)
>=75	1.3 (1.2, 1.5)	1.8 (1.6, 1.9)	2.1 (1.9, 2.2)	2.3 (2.1, 2.6)	2.7 (2.4, 3.0)

Table HT17: 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	943	49671	1.9	135270	0.7	(0.65, 0.74)
Male	781	42022	1.9	115514	0.7	(0.63, 0.73)
Total	**1724**	**91693**	**1.9**	**250784**	**0.7**	**(0.66, 0.72)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Female	49671	44213	39429	34707	29947	25426	21099	17092	13091	9471	6099	3482	1581
Male	42022	37528	33346	29419	25418	21711	18060	14774	11464	8434	5458	3122	1376

Table HT18: 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*	*5 years*
Female	1.2 (1.1, 1.3)	1.7 (1.6, 1.8)	2.1 (1.9, 2.2)	2.4 (2.2, 2.6)	2.8 (2.6, 3.0)
Male	1.2 (1.0, 1.3)	1.6 (1.5, 1.7)	2.0 (1.8, 2.1)	2.3 (2.1, 2.5)	2.8 (2.6, 3.0)

Table HT19: 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	98	4170	2.4	11519	0.9	(0.69, 1.04)
Female 55-64	211	10311	2.0	27934	0.8	(0.66, 0.86)
Female 65-74	318	17155	1.9	47571	0.7	(0.60, 0.75)
Female >= 75	316	18035	1.8	48246	0.7	(0.58, 0.73)
Males by Age						
Male <55	85	4886	1.7	14042	0.6	(0.48, 0.75)
Male 55-64	193	10474	1.8	29664	0.7	(0.56, 0.75)
Male 65-74	277	15724	1.8	43869	0.6	(0.56, 0.71)
Male >= 75	226	10938	2.1	27940	0.8	(0.71, 0.92)
Total	**1724**	**91693**	**1.9**	**250784**	**0.7**	**(0.66, 0.72)**

Figure HT13: Cumulative percentage revision of Primary Conventional Total Hip Procedures for Females by Age (primary diagnosis OA excluding infection)

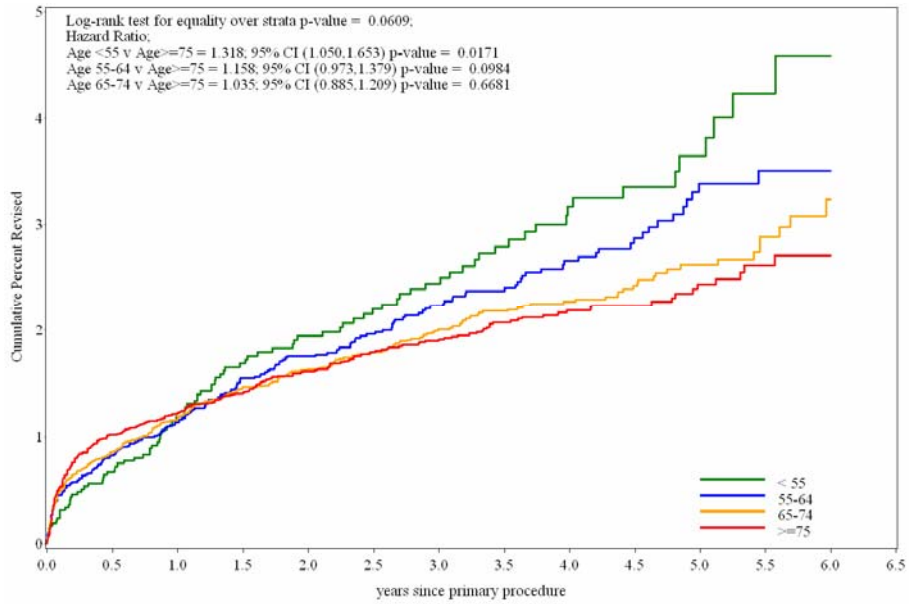
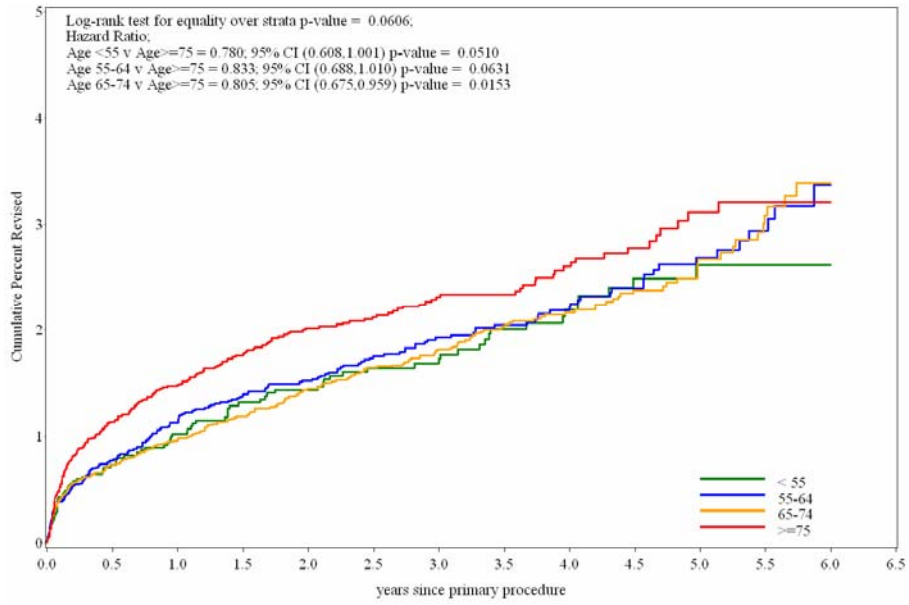


Figure HT14: Cumulative percentage revision of Primary Conventional Total Hip for Males by Age (primary diagnosis OA excluding infection)



Sex and Age	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Females by Age													
Female <55	4170	3704	3314	2912	2505	2149	1826	1479	1178	873	566	302	145
Female 55-64	10311	9163	8196	7173	6160	5225	4273	3452	2651	1965	1282	748	374
Female 65-74	17155	15386	13737	12146	10532	9007	7536	6143	4683	3394	2153	1262	574
Female >= 75	18035	15960	14182	12476	10750	9045	7464	6018	4579	3239	2098	1170	488
Males by Age													
Male <55	4886	4384	3908	3464	3058	2659	2272	1879	1509	1112	742	419	218
Male 55-64	10474	9408	8442	7478	6495	5599	4697	3897	3028	2295	1502	872	384
Male 65-74	15724	14133	12590	11170	9698	8307	6919	5652	4393	3206	2087	1204	512
Male >= 75	10938	9603	8406	7307	6167	5146	4172	3346	2534	1821	1127	627	262

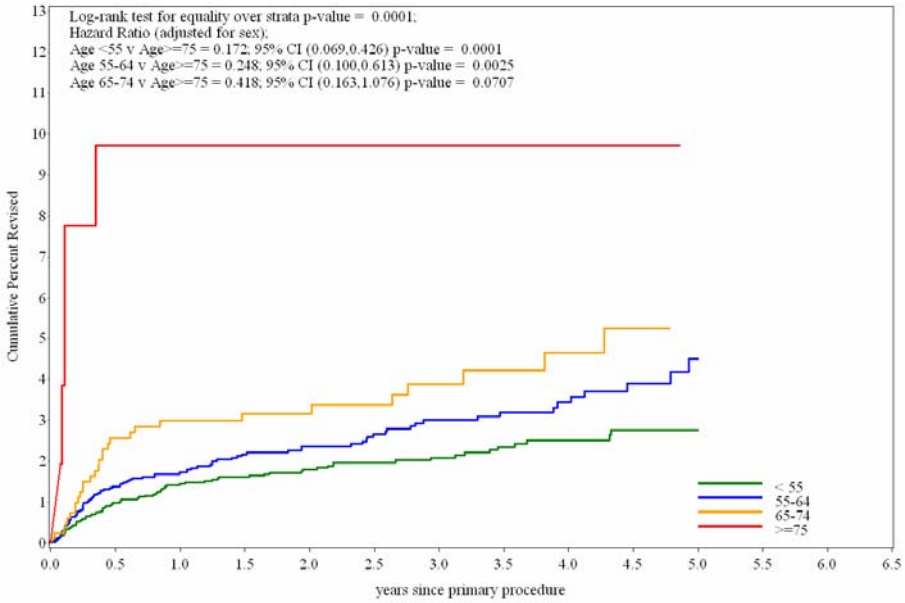
Table HT20: Yearly cumulative percentage revision of Primary Conventional Total Hip Procedures by Sex and Age (primary diagnosis OA excluding infection)

Sex and Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Females by Age					
Female <55	1.2 (0.9, 1.6)	1.9 (1.5, 2.5)	2.4 (2.0, 3.1)	3.2 (2.5, 3.9)	3.6 (2.9, 4.6)
Female 55-64	1.1 (0.9, 1.4)	1.8 (1.5, 2.1)	2.2 (1.9, 2.6)	2.7 (2.3, 3.1)	3.4 (2.9, 4.0)
Female 65-74	1.2 (1.0, 1.4)	1.6 (1.4, 1.9)	2.0 (1.8, 2.3)	2.3 (2.0, 2.6)	2.6 (2.3, 3.0)
Female >= 75	1.2 (1.1, 1.4)	1.6 (1.4, 1.8)	1.9 (1.7, 2.1)	2.2 (1.9, 2.5)	2.4 (2.1, 2.8)
Males by Age					
Male <55	1.0 (0.8, 1.4)	1.4 (1.1, 1.8)	1.7 (1.4, 2.2)	2.2 (1.7, 2.8)	2.6 (2.1, 3.3)
Male 55-64	1.1 (0.9, 1.4)	1.5 (1.3, 1.8)	1.9 (1.7, 2.3)	2.2 (1.9, 2.6)	2.7 (2.3, 3.2)
Male 65-74	1.0 (0.8, 1.1)	1.4 (1.3, 1.7)	1.8 (1.6, 2.1)	2.2 (1.9, 2.5)	2.7 (2.3, 3.1)
Male >= 75	1.5 (1.3, 1.7)	2.0 (1.8, 2.3)	2.3 (2.0, 2.7)	2.6 (2.3, 3.0)	3.1 (2.6, 3.7)

Table HT21: 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*
<55	79	4140	1.9	10685	0.7	(0.59, 0.92)
55-64	88	3346	2.6	8411	1.0	(0.84, 1.29)
65-74	31	823	3.8	2096	1.5	(1.00, 2.10)
>=75	5	52	9.6	156	3.2	(1.04, 7.50)
Total	**203**	**8361**	**2.4**	**21348**	**1.0**	**(0.82, 1.09)**

Figure HT15: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<55	4140	3691	3252	2836	2426	2023	1684	1308	976	642	359	160	54
55-64	3346	2954	2643	2250	1900	1575	1264	1012	735	483	263	116	27
65-74	823	723	642	558	473	402	330	262	193	124	60	22	3
>=75	52	46	43	42	39	34	29	23	15	12	4	0	0

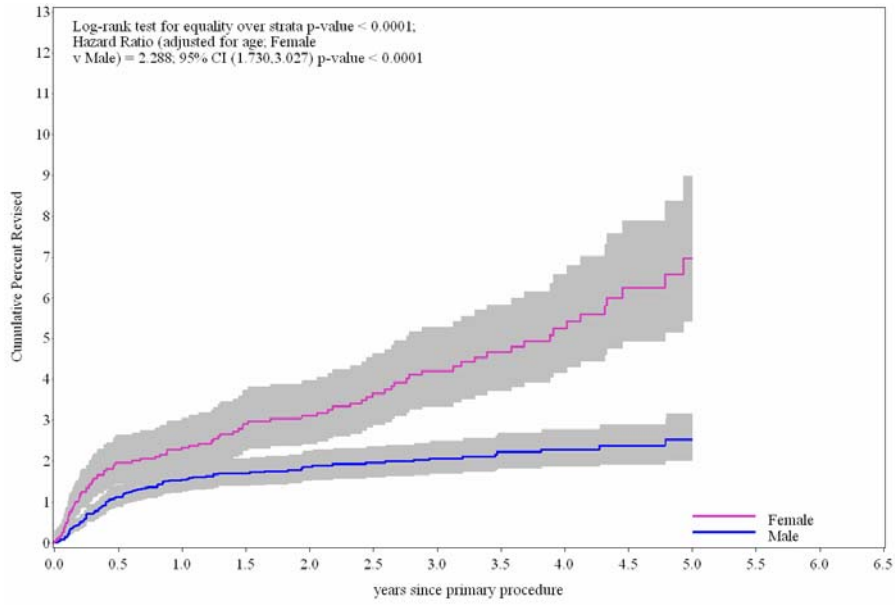
Table HT22: Yearly cumulative percentage revision of Primary Resurfacing Hip Procedures by Age (primary diagnosis OA excluding infection)

Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
<55	1.5 (1.1, 1.9)	1.8 (1.4, 2.3)	2.1 (1.6, 2.6)	2.5 (2.0, 3.2)	2.8 (2.2, 3.6)
55-64	1.7 (1.3, 2.2)	2.4 (1.9, 3.0)	3.0 (2.4, 3.8)	3.4 (2.7, 4.3)	4.5 (3.4, 6.0)
65-74	3.0 (2.0, 4.5)	3.2 (2.1, 4.7)	3.9 (2.6, 5.7)	4.6 (3.1, 6.9)	
>=75	9.7 (4.2, 21.8)	9.7 (4.2, 21.8)	9.7 (4.2, 21.8)	9.7 (4.2, 21.8)	

Table HT23: 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	91	2280	4.0	6008	1.5	(1.22, 1.86)
Male	112	6081	1.8	15340	0.7	(0.60, 0.88)
Total	**203**	**8361**	**2.4**	**21348**	**1.0**	**(0.82, 1.09)**

Figure HT16: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Female	2280	2019	1821	1577	1357	1143	954	758	570	383	218	95	27
Male	6081	5395	4759	4109	3481	2891	2353	1847	1349	878	468	203	57

Table HT24: 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*	*4 years*	*5 years*
Female	2.3 (1.8, 3.1)	3.1 (2.4, 4.0)	4.2 (3.3, 5.3)	5.2 (4.2, 6.6)	7.0 (5.4, 9.0)
Male	1.6 (1.3, 1.9)	1.9 (1.5, 2.3)	2.1 (1.7, 2.5)	2.3 (1.9, 2.8)	2.5 (2.0, 3.2)

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	38	1280	3.0	3323	1.1	(0.81, 1.57)
Female 55-64	45	899	5.0	2415	1.9	(1.36, 2.49)
Female >=65	8	101	7.9	271	3.0	(1.28, 5.83)
Males by Age						
Male <55	41	2860	1.4	7363	0.6	(0.40, 0.76)
Male 55-64	43	2447	1.8	5996	0.7	(0.52, 0.97)
Male >=65	28	774	3.6	1981	1.4	(0.94, 2.04)
Total	**203**	**8361**	**2.4**	**21348**	**1.0**	**(0.82, 1.09)**

Figure HT17: Cumulative percentage revision of primary Resurfacing hip procedures for Females by Age (primary diagnosis OA excluding infection)

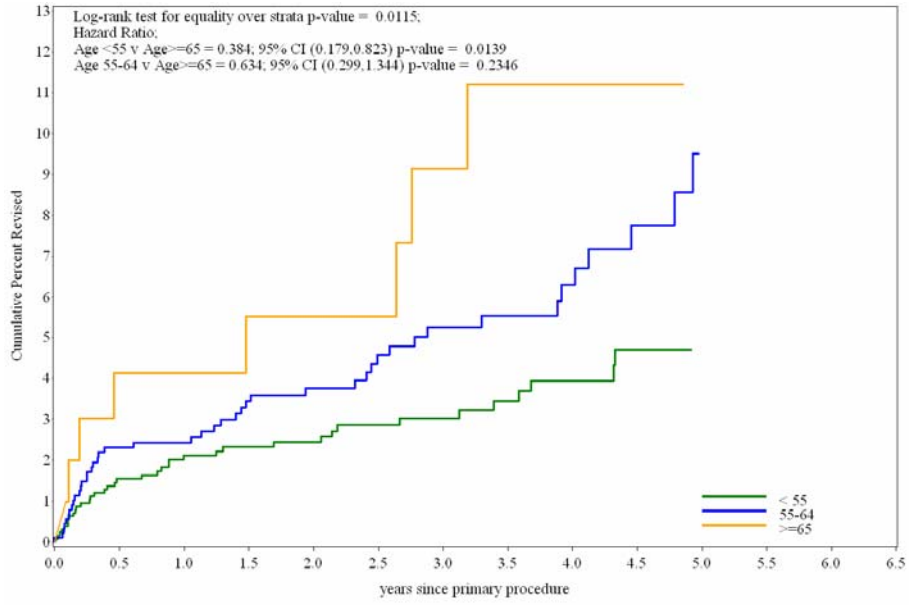
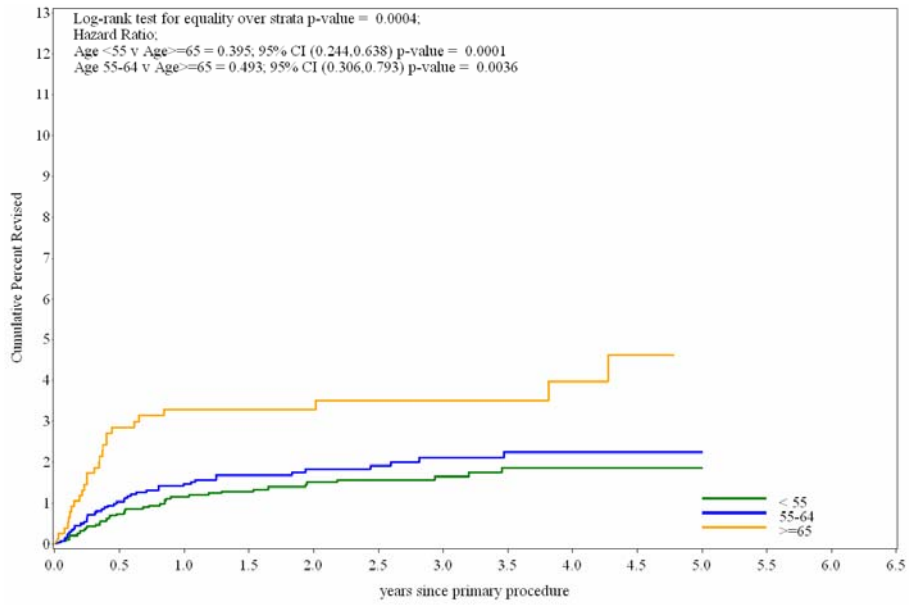


Figure HT18: Cumulative percentage revision of primary Resurfacing hip procedures for Males by Age (primary diagnosis OA excluding infection)



Sex and Age	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Females by Age													
Female <55	1280	1136	1001	868	744	625	526	412	317	214	120	56	18
Female 55-64	899	797	740	640	551	464	382	311	224	151	89	37	9
Female >=65	101	86	80	69	62	54	46	35	29	18	9	2	0
Males by Age													
Male <55	2860	2555	2251	1968	1682	1398	1158	896	659	428	239	104	36
Male 55-64	2447	2157	1903	1610	1349	1111	882	701	511	332	174	79	18
Male >=65	774	683	605	531	450	382	313	250	179	118	55	20	3

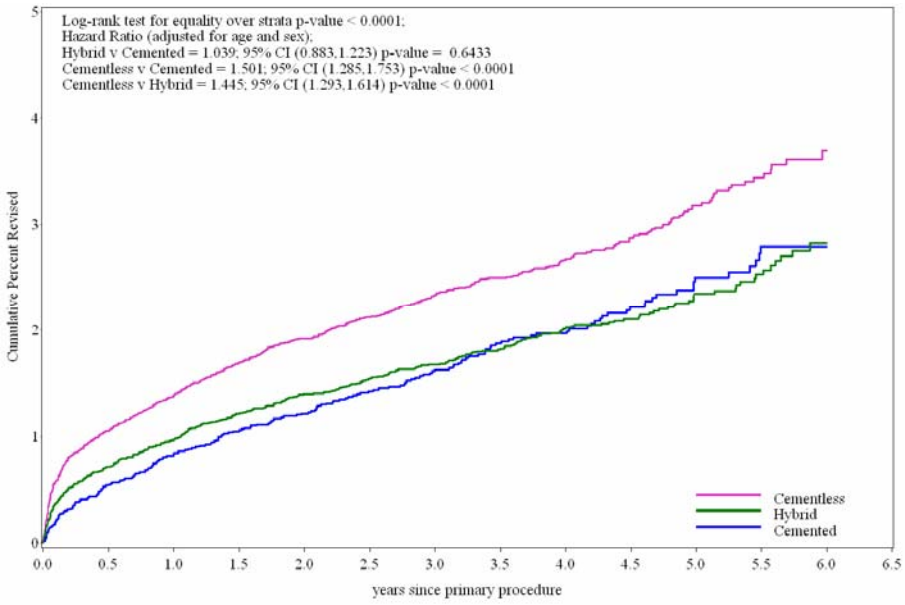
Table HT26: Yearly cumulative percentage revision of Primary Resurfacing Hip Procedures by Sex and Age (primary diagnosis OA excluding infection)

Sex and Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Females by Age					
Female <55	2.1 (1.4, 3.1)	2.4 (1.7, 3.5)	3.0 (2.1, 4.3)	3.9 (2.8, 5.6)	
Female 55-64	2.4 (1.6, 3.7)	3.8 (2.6, 5.3)	5.2 (3.8, 7.2)	6.3 (4.5, 8.7)	
Female >=65	4.1 (1.6, 10.7)	5.5 (2.3, 12.8)	9.1 (4.3, 18.7)	11.2 (5.6, 21.8)	
Males by Age					
Male <55	1.2 (0.8, 1.6)	1.5 (1.1, 2.1)	1.7 (1.2, 2.3)	1.9 (1.3, 2.6)	1.9 (1.3, 2.6)
Male 55-64	1.5 (1.0, 2.1)	1.8 (1.3, 2.5)	2.1 (1.5, 2.9)	2.2 (1.6, 3.1)	2.2 (1.6, 3.1)
Male >= 65	3.3 (2.2, 4.9)	3.3 (2.2, 4.9)	3.5 (2.4, 5.2)	4.0 (2.6, 6.0)	

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	204	11922	1.7	38506	0.5	(0.46, 0.61)
Cementless	1015	48542	2.1	123768	0.8	(0.77, 0.87)
Hybrid	505	31229	1.6	88510	0.6	(0.52, 0.62)
Total	**1724**	**91693**	**1.9**	**250784**	**0.7**	**(0.66, 0.72)**

Figure HT19: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Cemented	11922	10985	10167	9305	8412	7432	6468	5508	4472	3441	2410	1516	713
Cementless	48542	42694	37377	32369	27440	22967	18653	14804	11097	7817	4766	2527	1092
Hybrid	31229	28062	25231	22452	19513	16738	14038	11554	8986	6647	4381	2561	1152

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*	*5 years*
Cemented	0.8 (0.7, 1.0)	1.2 (1.0, 1.4)	1.6 (1.4, 1.9)	2.0 (1.7, 2.3)	2.5 (2.1, 2.9)
Cementless	1.4 (1.3, 1.5)	1.9 (1.8, 2.1)	2.3 (2.2, 2.5)	2.7 (2.5, 2.9)	3.2 (2.9, 3.4)
Hybrid	1.0 (0.9, 1.1)	1.4 (1.3, 1.5)	1.7 (1.5, 1.8)	2.0 (1.8, 2.2)	2.3 (2.1, 2.6)

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	9	452	2.0	1544	0.6	(0.27, 1.11)
<55	Cementless	147	7165	2.1	19481	0.8	(0.64, 0.89)
<55	Hybrid	27	1439	1.9	4535	0.6	(0.39, 0.87)
55-64	Cemented	36	1460	2.5	4975	0.7	(0.51, 1.00)
55-64	Cementless	294	14462	2.0	38155	0.8	(0.68, 0.86)
55-64	Hybrid	74	4863	1.5	14469	0.5	(0.40, 0.64)
65-74	Cemented	75	4245	1.8	14128	0.5	(0.42, 0.67)
65-74	Cementless	320	16807	1.9	42956	0.7	(0.67, 0.83)
65-74	Hybrid	200	11827	1.7	34356	0.6	(0.50, 0.67)
>=75	Cemented	84	5765	1.5	17859	0.5	(0.38, 0.58)
>=75	Cementless	254	10108	2.5	23177	1.1	(0.97, 1.24)
>=75	Hybrid	204	13100	1.6	35151	0.6	(0.50, 0.67)
Total		**1724**	**91693**	**1.9**	**250784**	**0.7**	**(0.66, 0.72)**

Figure HT20: Cumulative percentage revision of Conventional Total Hip Replacement by cement status for patients aged <55 years (primary diagnosis OA excluding infection)

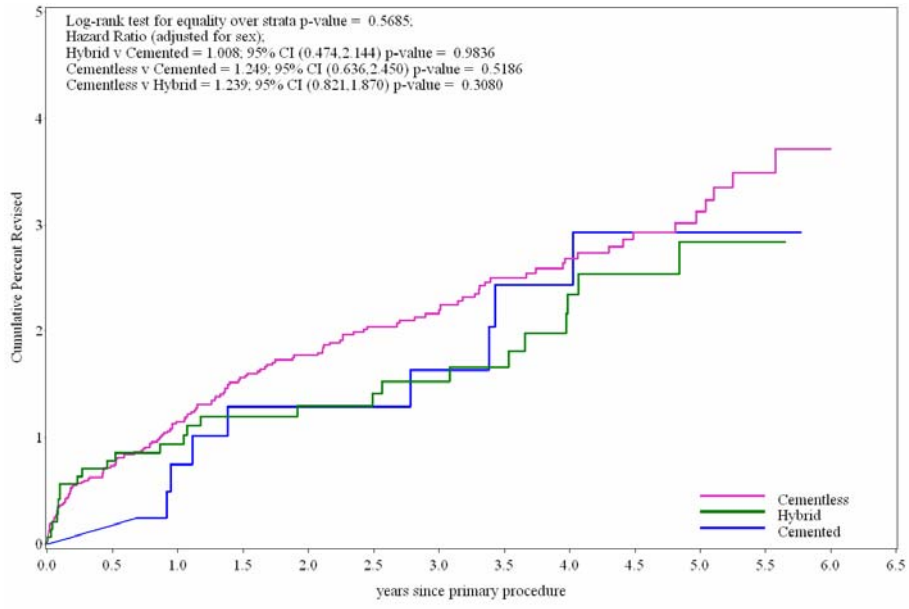


Figure HT21: Cumulative percentage revision of Conventional Total Hip Replacement by cement fixation for patients aged 55-64 years (primary diagnosis OA excluding infection)

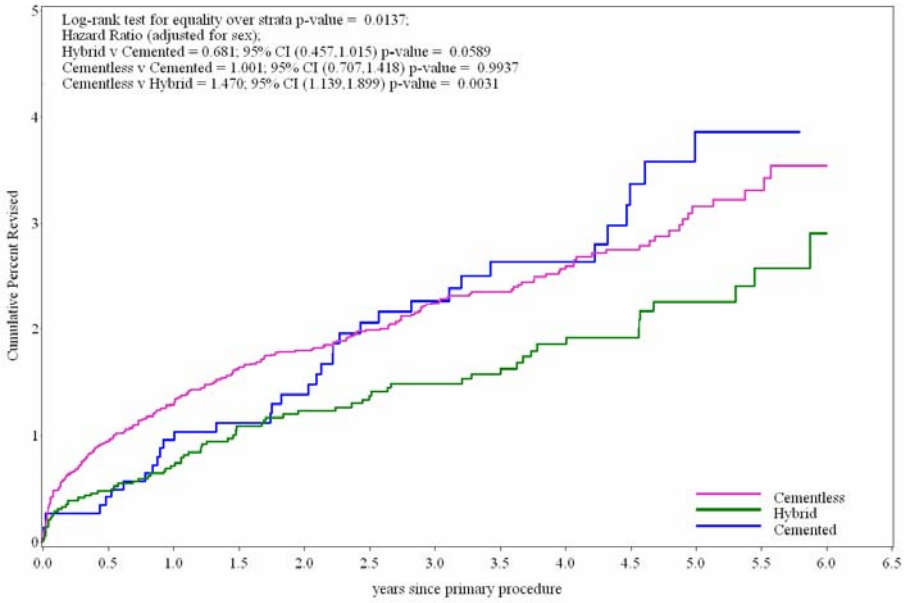


Figure HT22: Cumulative percentage revision of Conventional Total Hip Replacement by cement fixation for patients aged 65-74 years (primary diagnosis OA excluding infection)

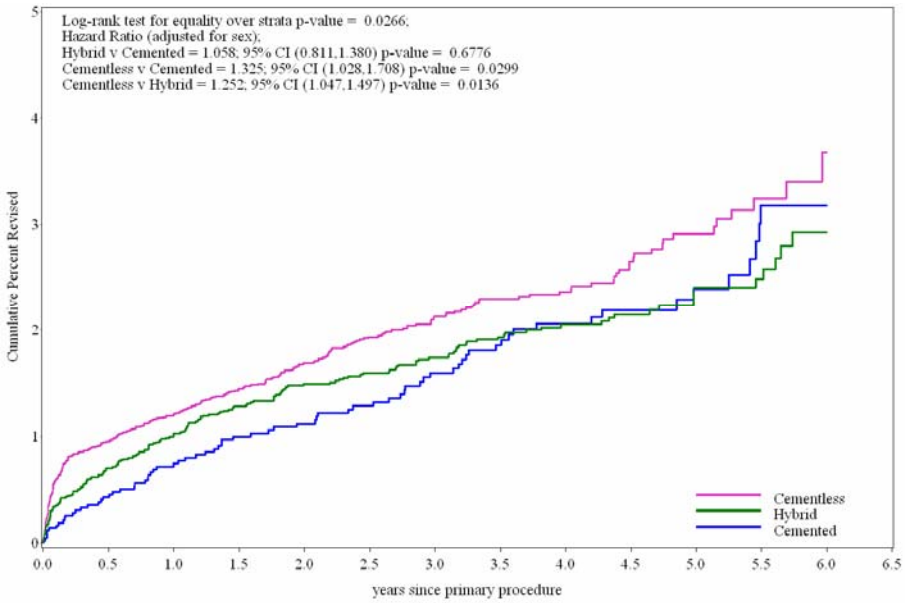


Figure HT23: Cumulative percentage revision of Conventional Total Hip Replacement by type of fixation for patients aged >=75 years (primary diagnosis OA excluding infection)

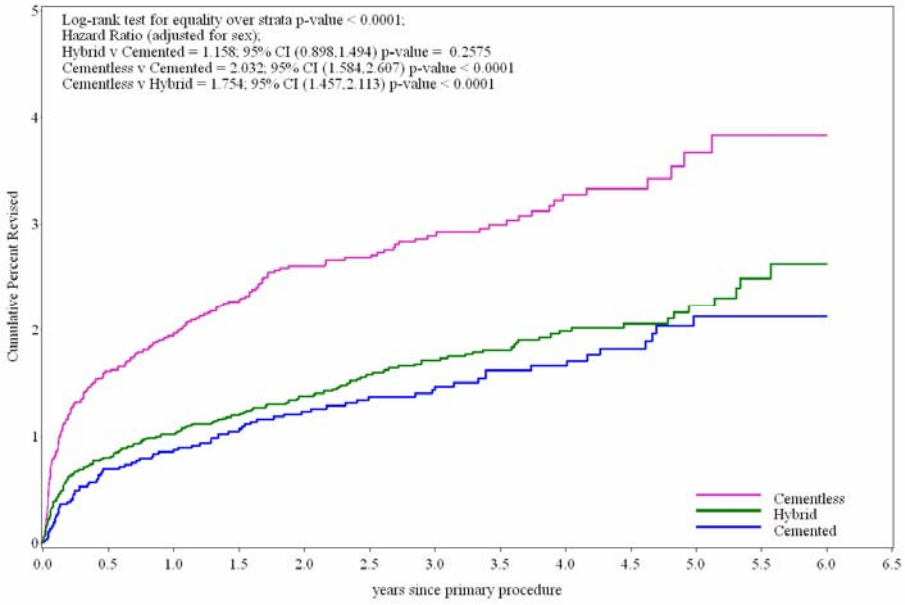


Table HT30: Yearly cumulative percentage revision of Conventional Primary Total Hip Replacement by Cement Fixation and Age (primary diagnosis OA excluding infection)

Age	*Fixation*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
<55	Cemented	0.8 (0.2, 2.3)	1.3 (0.5, 3.1)	1.6 (0.7, 3.6)	2.4 (1.2, 4.9)	2.9 (1.5, 5.7)
<55	Cementless	1.2 (0.9, 1.4)	1.8 (1.5, 2.1)	2.2 (1.8, 2.6)	2.7 (2.3, 3.2)	3.1 (2.6, 3.8)
<55	Hybrid	0.9 (0.5, 1.6)	1.3 (0.8, 2.1)	1.5 (1.0, 2.4)	2.4 (1.5, 3.6)	2.8 (1.9, 4.3)
55-64	Cemented	1.0 (0.6, 1.6)	1.4 (0.9, 2.2)	2.3 (1.6, 3.3)	2.6 (1.8, 3.8)	3.9 (2.7, 5.5)
55-64	Cementless	1.3 (1.1, 1.5)	1.8 (1.6, 2.1)	2.3 (2.0, 2.6)	2.6 (2.3, 2.9)	3.2 (2.7, 3.6)
55-64	Hybrid	0.7 (0.5, 1.0)	1.2 (0.9, 1.6)	1.5 (1.1, 1.9)	1.9 (1.4, 2.4)	2.3 (1.7, 2.9)
65-74	Cemented	0.7 (0.5, 1.1)	1.1 (0.8, 1.5)	1.6 (1.2, 2.1)	2.1 (1.6, 2.6)	2.4 (1.9, 3.1)
65-74	Cementless	1.2 (1.0, 1.4)	1.7 (1.5, 1.9)	2.1 (1.9, 2.4)	2.4 (2.1, 2.7)	2.9 (2.5, 3.3)
65-74	Hybrid	1.0 (0.9, 1.2)	1.5 (1.3, 1.8)	1.7 (1.5, 2.0)	2.1 (1.8, 2.4)	2.4 (2.0, 2.8)
>=75	Cemented	0.9 (0.7, 1.2)	1.2 (1.0, 1.6)	1.4 (1.1, 1.8)	1.7 (1.3, 2.1)	2.1 (1.7, 2.7)
>=75	Cementless	2.0 (1.7, 2.3)	2.6 (2.3, 3.0)	2.9 (2.5, 3.3)	3.3 (2.9, 3.8)	3.7 (3.1, 4.3)
>=75	Hybrid	1.0 (0.9, 1.2)	1.4 (1.2, 1.6)	1.7 (1.5, 2.0)	2.0 (1.7, 2.3)	2.2 (1.9, 2.6)

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	2	337	0.6	972	0.2	(0.02, 0.74)
CPCS	Reflection	7	423	1.7	923	0.8	(0.30, 1.56)
CPT	ZCA	10	398	2.5	1481	0.7	(0.32, 1.24)
Charnley	Charnley	10	406	2.5	1391	0.7	(0.34, 1.32)
Charnley	Charnley Ogee	19	619	3.1	2010	0.9	(0.57, 1.48)
Elite Plus	Charnley Ogee	3	276	1.1	1073	0.3	(0.06, 0.82)
Exeter	Contemporary	21	513	4.1	2523	0.8	(0.52, 1.27)
Exeter	Exeter	9	419	2.1	2176	0.4	(0.19, 0.79)
Exeter V40	Contemporary	76	3963	1.9	9241	0.8	(0.65, 1.03)
Exeter V40	Exeter	24	1221	2.0	3808	0.6	(0.40, 0.94)
MS 30	Low Profile Cup	4	579	0.7	2229	0.2	(0.05, 0.46)
Spectron EF	Reflection	18	1120	1.6	3752	0.5	(0.28, 0.76)
Other (214)	-	105	3992	2.6	12924	0.8	(0.66, 0.98)
Total		**308**	**14266**	**2.2**	**44503**	**0.7**	**(0.62, 0.77)**

Note: *some cementless components have been cemented*

Table HT32: Yearly cumulative percentage revision 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*	*5 years*
C-Stem	Elite Plus LPW	0.7 (0.2, 2.8)	0.7 (0.2, 2.8)	0.7 (0.2, 2.8)	0.7 (0.2, 2.8)	
CPCS	Reflection	1.3 (0.5, 3.1)	1.6 (0.7, 3.7)	2.1 (1.0, 4.6)	2.1 (1.0, 4.6)	
CPT	ZCA	0.8 (0.3, 2.4)	1.1 (0.4, 2.8)	2.4 (1.2, 4.8)	2.9 (1.5, 5.5)	3.4 (1.8, 6.3)
Charnley	Charnley	0.8 (0.3, 2.4)	1.4 (0.6, 3.3)	1.8 (0.8, 4.0)	2.7 (1.3, 5.4)	4.1 (2.1, 7.9)
Charnley	Charnley Ogee	1.2 (0.6, 2.5)	2.2 (1.2, 3.8)	2.6 (1.6, 4.4)	3.3 (2.0, 5.5)	4.2 (2.6, 6.9)
Elite Plus	Charnley Ogee	1.1 (0.4, 3.4)	1.1 (0.4, 3.4)	1.1 (0.4, 3.4)	1.1 (0.4, 3.4)	1.1 (0.4, 3.4)
Exeter	Contemporary	1.8 (0.9, 3.4)	2.8 (1.7, 4.7)	3.7 (2.3, 5.8)	3.7 (2.3, 5.8)	4.2 (2.7, 6.4)
Exeter	Exeter	1.0 (0.4, 2.6)	1.2 (0.5, 2.9)	1.2 (0.5, 2.9)	1.2 (0.5, 2.9)	2.1 (1.1, 4.2)
Exeter V40	Contemporary	1.3 (1.0, 1.7)	1.9 (1.5, 2.5)	2.3 (1.8, 2.9)	2.6 (2.1, 3.3)	2.6 (2.1, 3.3)
Exeter V40	Exeter	0.8 (0.4, 1.5)	1.2 (0.7, 2.0)	1.9 (1.2, 3.1)	2.5 (1.6, 3.8)	3.0 (1.8, 4.9)
MS 30	Low Profile Cup	0.4 (0.1, 1.4)	0.4 (0.1, 1.4)	0.6 (0.2, 1.9)	0.9 (0.3, 2.5)	0.9 (0.3, 2.5
Spectron EF	Reflection	0.8 (0.4, 1.5)	1.0 (0.5, 1.8)	1.7 (1.0, 2.8)	2.0 (1.2, 3.3)	2.3 (1.4, 3.6)
Other (214)	-	1.3 (1.0, 1.7)	2.0 (1.5, 2.5)	2.4 (1.9, 2.9)	2.9 (2.3, 3.6)	3.8 (3.1, 4.7)

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	85	2534	3.4	8482	1.0	(0.80, 1.24)
ABGII	ABGII (shell & insert)	11	618	1.8	1479	0.7	(0.37, 1.33)
ABGII	Trident	37	1178	3.1	2727	1.4	(0.96, 1.87)
Accolade	Trident	55	2924	1.9	4580	1.2	(0.90, 1.56)
Alloclassic	Allofit	53	2729	1.9	6499	0.8	(0.61, 1.07)
Alloclassic	Durom	8	341	2.3	408	2.0	(0.85, 3.86)
Alloclassic	Fitmore	38	1145	3.3	3182	1.2	(0.85, 1.64)
Alloclassic	Morscher	9	405	2.2	1539	0.6	(0.27, 1.11)
CLS	Allofit	9	469	1.9	1216	0.7	(0.34, 1.40)
CLS	Fitmore	15	446	3.4	1570	1.0	(0.53, 1.58)
Citation	Trident	17	702	2.4	1542	1.1	(0.64, 1.76)
Citation	Vitalock	10	550	1.8	2108	0.5	(0.23, 0.87)
Corail	ASR	13	854	1.5	701	1.9	(0.99, 3.17)
Corail	Duraloc	17	762	2.2	1990	0.9	(0.50, 1.37)
Corail	Pinnacle	31	1568	2.0	2057	1.5	(1.02, 2.14)
Epoch	Trilogy	8	443	1.8	876	0.9	(0.39, 1.80)
F2L Multineck	SPH-Blind	30	611	4.9	2205	1.4	(0.92, 1.94)
Mallory-Head	M2a	9	266	3.4	616	1.5	(0.67, 2.77)
Mallory-Head	Mallory-Head	41	1643	2.5	5488	0.7	(0.54, 1.01)
Meridian	Trident	8	252	3.2	588	1.4	(0.59, 2.68)
Meridian	Vitalock	11	385	2.9	1418	0.8	(0.39, 1.39)
Natural Hip	Fitmore	12	721	1.7	2346	0.5	(0.26, 0.89)
Omnifit	Secur-Fit	26	496	5.2	1975	1.3	(0.86, 1.93)
Omnifit	Trident	26	881	3.0	3177	0.8	(0.53, 1.20)
S-Rom	Option	16	662	2.4	2417	0.7	(0.38, 1.07)
S-Rom	Pinnacle	21	933	2.3	1599	1.3	(0.81, 2.01)
SL-Plus	EPF-Plus	16	951	1.7	1296	1.2	(0.71, 2.01)
Secur-Fit	Trident	58	2512	2.3	6803	0.9	(0.65, 1.10)
Secur-Fit Plus	Trident	64	3291	1.9	9871	0.6	(0.50, 0.83)
Stability	Duraloc	10	399	2.5	1608	0.6	(0.30, 1.14)
Summit	ASR	5	563	0.9	554	0.9	(0.29, 2.11)
Summit	Pinnacle	15	1152	1.3	2075	0.7	(0.40, 1.19)
Synergy	BHR	6	359	1.7	340	1.8	(0.65, 3.84)
Synergy	Reflection	116	5551	2.1	13891	0.8	(0.69, 1.00)
Taperloc	M2a	11	319	3.4	739	1.5	(0.74, 2.66)
Taperloc	Mallory-Head	14	663	2.1	1805	0.8	(0.42, 1.30)
VerSys	Trilogy	82	3015	2.7	8381	1.0	(0.78, 1.21)
Other (535)	-	337	11125	3.0	28522	1.2	(1.06, 1.31)
Total		**1350**	**54418**	**2.5**	**138670**	**1.0**	**(0.92, 1.03)**

Table HT34: Yearly cumulative percentage revision 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*	*5 years*
ABGII	ABGII	1.7 (1.2, 2.3)	2.4 (1.9, 3.1)	3.0 (2.4, 3.8)	3.4 (2.7, 4.3)	4.6 (3.6, 5.9)
ABGII	ABGII (shell & insert)	1.3 (0.7, 2.6)	1.5 (0.8, 2.9)	1.9 (1.0, 3.5)		
ABGII	Trident	2.0 (1.3, 3.1)	3.4 (2.4, 4.8)	3.7 (2.7, 5.2)	4.2 (3.0, 5.8)	
Accolade	Trident	1.4 (1.0, 2.0)	2.4 (1.8, 3.2)	3.1 (2.3, 4.1)	3.1 (2.3, 4.1)	
Alloclassic	Allofit	1.5 (1.1, 2.1)	1.9 (1.5, 2.6)	2.4 (1.8, 3.2)	2.6 (1.9, 3.5)	2.6 (1.9, 3.5)
Alloclassic	Durom	2.2 (1.0, 5.0)	2.8 (1.3, 5.9)			
Alloclassic	Fitmore	2.3 (1.5, 3.4)	3.2 (2.2, 4.4)	3.5 (2.5, 4.9)	3.7 (2.7, 5.2)	
Alloclassic	Morscher	1.0 (0.4, 2.6)	1.8 (0.8, 3.7)	2.1 (1.0, 4.1)	2.5 (1.3, 4.7)	2.5 (1.3, 4.7)
CLS	Allofit	1.4 (0.6, 3.1)	1.7 (0.8, 3.5)	2.1 (1.0, 4.2)	2.8 (1.3, 5.7)	
CLS	Fitmore	1.8 (0.9, 3.6)	2.4 (1.3, 4.4)	4.0 (2.4, 6.6)	4.0 (2.4, 6.6)	4.0 (2.4, 6.6)
Citation	Trident	2.2 (1.3, 3.7)	2.4 (1.5, 4.0)	2.8 (1.7, 4.7)	2.8 (1.7, 4.7)	
Citation	Vitalock	0.4 (0.1, 1.5)	0.9 (0.4, 2.2)	1.9 (1.0, 3.6)	2.2 (1.2, 4.1)	2.2 (1.2, 4.1)
Corail	ASR	1.6 (0.8, 3.1)				
Corail	Duraloc	1.5 (0.8, 2.7)	2.0 (1.2, 3.4)	2.3 (1.4, 3.8)	2.6 (1.5, 4.2)	
Corail	Pinnacle	2.1 (1.5, 3.0)	2.2 (1.6, 3.2)			
Epoch	Trilogy	1.6 (0.8, 3.4)	1.6 (0.8, 3.4)	2.2 (1.0, 4.5)	2.2 (1.0, 4.5)	
F2L Multineck	SPH-Blind	2.8 (1.8, 4.5)	3.8 (2.6, 5.7)	4.6 (3.2, 6.7)	5.4 (3.8, 7.7)	5.4 (3.8, 7.7)
Mallory-Head	M2a	1.2 (0.4, 3.5)	3.3 (1.7, 6.5)	3.9 (2.0, 7.6)		
Mallory-Head	Mallory-Head	1.6 (1.1, 2.3)	1.9 (1.4, 2.8)	2.0 (1.4, 2.9)	2.6 (1.9, 3.7)	3.3 (2.3, 4.6)
Meridian	Trident	2.3 (0.9, 5.4)	2.8 (1.3, 6.2)	3.8 (1.8, 8.2)	3.8 (1.8, 8.2)	
Meridian	Vitalock	1.1 (0.4, 2.8)	1.9 (0.9, 3.9)	2.6 (1.3, 4.9)	3.5 (1.9, 6.4)	3.5 (1.9, 6.4)
Natural Hip	Fitmore	1.3 (0.7, 2.4)	1.4 (0.8, 2.7)	1.4 (0.8, 2.7)	1.7 (0.9, 3.2)	1.7 (0.9, 3.2)
Omnifit	Secur-Fit	2.6 (1.5, 4.5)	3.3 (2.0, 5.3)	4.5 (2.9, 6.8)	5.1 (3.4, 7.6)	6.0 (4.0, 9.0)
Omnifit	Trident	1.6 (1.0, 2.7)	1.9 (1.2, 3.0)	2.6 (1.7, 4.0)	3.0 (2.0, 4.6)	4.0 (2.6, 6.0)
S-Rom	Option	1.5 (0.8, 2.8)	1.8 (1.1, 3.2)	2.2 (1.3, 3.8)	2.5 (1.5, 4.3)	3.0 (1.8, 5.1)
S-Rom	Pinnacle	2.0 (1.2, 3.2)	2.2 (1.4, 3.5)	3.0 (1.8, 4.9)		
SL-Plus	EPF-Plus	1.4 (0.8, 2.5)	1.8 (1.1, 3.2)			
Secur-Fit	Trident	1.4 (1.0, 1.9)	2.2 (1.6, 2.9)	2.4 (1.8, 3.2)	2.7 (2.0, 3.6)	3.2 (2.3, 4.4)
Secur-Fit Plus	Trident	1.2 (0.9, 1.7)	1.8 (1.4, 2.4)	2.0 (1.6, 2.6)	2.2 (1.7, 2.8)	2.4 (1.8, 3.1)
Stability	Duraloc	0.8 (0.2, 2.3)	1.8 (0.8, 3.7)	2.4 (1.2, 4.5)	2.4 (1.2, 4.5)	2.4 (1.2, 4.5)
Summit	ASR	0.9 (0.4, 2.2)				
Summit	Pinnacle	1.3 (0.7, 2.2)	1.5 (0.9, 2.6)	1.5 (0.9, 2.6)		
Synergy	BHR	1.5 (0.6, 3.5)				
Synergy	Reflection	1.4 (1.1, 1.8)	1.9 (1.6, 2.4)	2.4 (2.0, 2.9)	2.6 (2.1, 3.2)	3.4 (2.6, 4.4)
Taperloc	M2a	1.3 (0.5, 3.5)	3.0 (1.5, 5.9)	3.5 (1.8, 6.6)		
Taperloc	Mallory-Head	1.6 (0.8, 2.9)	1.9 (1.1, 3.4)	2.2 (1.3, 3.9)	2.2 (1.3, 3.9)	3.4 (1.6, 7.1)
VerSys	Trilogy	2.1 (1.7, 2.7)	2.6 (2.1, 3.2)	2.8 (2.2, 3.5)	3.0 (2.4, 3.7)	3.8 (2.8, 5.1)
Other (535)	-	2.0 (1.8, 2.3)	2.8 (2.5, 3.2)	3.5 (3.1, 4.0)	4.0 (3.5, 4.5)	4.6 (4.1, 5.3)

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	32	900	3.6	2625	1.2	(0.83, 1.72)
C-Stem	Pinnacle	8	253	3.2	369	2.2	(0.94, 4.28)
CPCS	Reflection	10	1063	0.9	2119	0.5	(0.23, 0.87)
CPT	Trilogy	45	2168	2.1	6204	0.7	(0.53, 0.97)
Charnley	Vitalock	14	377	3.7	1573	0.9	(0.49, 1.49)
Definition	Vitalock	2	371	0.5	1776	0.1	(0.01, 0.41)
Elite Plus	Duraloc	43	1064	4.0	4247	1.0	(0.73, 1.36)
Elite Plus	Pinnacle	5	303	1.7	648	0.8	(0.25, 1.80)
Exeter	Mallory-Head	4	341	1.2	1375	0.3	(0.08, 0.74)
Exeter	Vitalock	33	1218	2.7	6461	0.5	(0.35, 0.72)
Exeter V40	ABGII	15	941	1.6	3377	0.4	(0.25, 0.73)
Exeter V40	Mallory-Head	7	625	1.1	1826	0.4	(0.15, 0.79)
Exeter V40	Trident	170	10354	1.6	20541	0.8	(0.71, 0.96)
Exeter V40	Trilogy	8	299	2.7	698	1.1	(0.49, 2.26)
Exeter V40	Vitalock	32	1905	1.7	6048	0.5	(0.36, 0.75)
Freeman	Mallory-Head	11	308	3.6	1287	0.9	(0.43, 1.53)
MS 30	Allofit	16	761	2.1	1945	0.8	(0.47, 1.34)
MS 30	Fitmore	3	339	0.9	1372	0.2	(0.05, 0.64)
Omnifit	Secur-Fit	11	272	4.0	1198	0.9	(0.46, 1.64)
Omnifit	Trident	40	1215	3.3	3818	1.0	(0.75, 1.43)
Spectron EF	Reflection	81	3166	2.6	9339	0.9	(0.69, 1.08)
VerSys	Trilogy	9	607	1.5	1858	0.5	(0.22, 0.92)
Other (301)	-	165	6357	2.6	18251	0.9	(0.77, 1.05)
Total		**764**	**35164**	**2.2**	**98909**	**0.8**	**(0.72, 0.83)**

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*	*5 years*
C-Stem	Duraloc	2.4 (1.5, 3.7)	3.4 (2.4, 5.0)	3.4 (2.4, 5.0)	4.1 (2.8, 6.0)	5.2 (3.4, 8.0)
C-Stem	Pinnacle	2.6 (1.2, 5.7)	3.7 (1.6, 8.1)			
CPCS	Reflection	0.9 (0.5, 1.8)	0.9 (0.5, 1.8)	1.2 (0.6, 2.3)	1.2 (0.6, 2.3)	
CPT	Trilogy	1.4 (0.9, 2.0)	2.0 (1.4, 2.7)	2.3 (1.7, 3.1)	2.7 (2.0, 3.6)	2.7 (2.0, 3.6)
Charnley	Vitalock	1.9 (0.9, 3.9)	2.7 (1.5, 4.9)	3.0 (1.7, 5.4)	4.1 (2.5, 6.9)	4.1 (2.5, 6.9)
Definition	Vitalock	0.3 (0.0, 1.9)	0.3 (0.0, 1.9)	0.3 (0.0, 1.9)	0.3 (0.0, 1.9)	0.8 (0.2, 3.3)
Elite Plus	Duraloc	1.9 (1.2, 3.0)	2.6 (1.8, 3.8)	3.6 (2.6, 4.9)	4.1 (3.0, 5.6)	4.6 (3.4, 6.3)
Elite Plus	Pinnacle	1.0 (0.3, 3.2)	1.9 (0.8, 4.6)	1.9 (0.8, 4.6)		
Exeter	Mallory-Head	0.6 (0.1, 2.3)	0.6 (0.1, 2.3)	1.0 (0.3, 3.0)	1.5 (0.5, 4.0)	1.5 (0.5, 4.0)
Exeter	Vitalock	1.6 (1.0, 2.5)	2.1 (1.4, 3.1)	2.3 (1.6, 3.4)	2.5 (1.8, 3.6)	2.5 (1.8, 3.6)
Exeter V40	ABGII	1.1 (0.6, 2.0)	1.2 (0.7, 2.1)	1.3 (0.7, 2.3)	1.5 (0.9, 2.6)	2.1 (1.2, 3.7)
Exeter V40	Mallory-Head	0.7 (0.3, 1.8)	1.1 (0.5, 2.4)	1.4 (0.6, 2.8)	1.4 (0.6, 2.8)	
Exeter V40	Trident	1.2 (1.0, 1.5)	1.7 (1.5, 2.0)	2.2 (1.8, 2.5)	2.5 (2.1, 3.1)	
Exeter V40	Trilogy	2.5 (1.2, 5.3)	2.5 (1.2, 5.3)	3.3 (1.6, 6.8)	3.3 (1.6, 6.8)	
Exeter V40	Vitalock	0.9 (0.6, 1.5)	1.3 (0.9, 2.0)	1.6 (1.1, 2.4)	2.0 (1.4, 2.9)	
Freeman	Mallory-Head	2.3 (1.1, 4.7)	3.6 (2.0, 6.4)	3.6 (2.0, 6.4)	3.6 (2.0, 6.4)	3.6 (2.0, 6.4)
MS 30	Allofit	1.4 (0.7, 2.5)	2.0 (1.1, 3.4)	2.5 (1.5, 4.2)	2.9 (1.7, 5.0)	
MS 30	Fitmore	0	0	0.4 (0.1, 2.6)	0.4 (0.1, 2.6)	1.4 (0.4, 4.2)
Omnifit	Secur-Fit	0.8 (0.2, 3.0)	2.4 (1.1, 5.2)	2.8 (1.3, 5.8)	2.8 (1.3, 5.8)	4.0 (2.1, 7.7)
Omnifit	Trident	2.2 (1.5, 3.2)	3.0 (2.2, 4.2)	3.7 (2.7, 5.0)	3.7 (2.7, 5.0)	3.7 (2.7, 5.0)
Spectron EF	Reflection	1.3 (1.0, 1.8)	2.1 (1.6, 2.7)	2.5 (1.9, 3.2)	3.0 (2.3, 3.8)	3.8 (3.0, 5.0)
VerSys	Trilogy	1.2 (0.6, 2.5)	1.6 (0.9, 3.2)	1.6 (0.9, 3.2)	1.6 (0.9, 3.2)	1.6 (0.9, 3.2)
Other (301)	-	1.6 (1.3, 2.0)	2.1 (1.8, 2.6)	2.7 (2.3, 3.2)	3.3 (2.8, 3.9)	3.8 (3.2, 4.6)

***Note**: Cumulative Percent Revised equal to 0 indicates that the prosthesis combination has been followed up to this time with no revisions recorded*

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	31	753	4.1	1042	3.0	(2.02, 4.22)
Adept	Adept	0	144	0.0	82	0.0	(0.00, 4.47)
BHR	BHR	166	6773	2.5	19585	0.8	(0.72, 0.99)
Bionik	Bionik	1	42	2.4	28	3.5	(0.09, 19.72)
Conserve	Conserve Plus	0	7	0.0	7	0.0	(0.00, 53.17)
Conserve Plus	Conserve Plus	4	59	6.8	134	3.0	(0.81, 7.63)
Cormet	Cormet	8	181	4.4	579	1.4	(0.60, 2.72)
Cormet 2000 (HAP)	Cormet	8	95	8.4	288	2.8	(1.20, 5.48)
Cormet (Bi-Coated)	Cormet	1	130	0.8	132	0.8	(0.02, 4.21)
Durom	Durom	25	564	4.4	927	2.7	(1.75, 3.98)
Icon	Icon	1	51	2.0	50	2.0	(0.05, 11.10)
Mitch TRH	Mitch TRH	0	94	0.0	25	0.0	(0.00, 14.77)
Recap	Recap	2	50	4.0	81	2.5	(0.30, 8.92)
Total		**247**	**8943**	**2.8**	**22961**	**1.1**	**(0.95, 1.22)**

Note: *Two resurfacing hip procedures using only a Conserve resurfacing head and no acetabular component have been removed from the above table.*

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*	*5 years*
ASR	ASR	4.0 (2.8, 5.9)	5.2 (3.5, 7.6)			
Adept	Adept	0				
BHR	BHR	1.6 (1.3, 1.9)	2.0 (1.7, 2.4)	2.5 (2.1, 2.9)	2.9 (2.5, 3.5)	3.7 (3.1, 4.4)
Bionik	Bionik	2.6 (0.4, 17.2)				
Conserve	Conserve Plus	0	0			
Conserve Plus	Conserve Plus	3.4 (0.9, 12.9)	3.4 (0.9, 12.9)	8.8 (2.4, 29.3)	16.4 (5.4, 43.9)	16.4 (5.4, 43.9)
Cormet	Cormet	1.7 (0.5, 5.1)	3.0 (1.2, 7.0)	4.4 (2.1, 9.1)	4.4 (2.1, 9.1)	7.4 (3.0, 17.6)
Cormet 2000 (HAP)	Cormet	6.3 (2.9, 13.5)	7.4 (3.6, 14.8)	9.2 (4.6, 17.8)	9.2 (4.6, 17.8)	9.2 (4.6, 17.8)
Cormet (Bi-Coated)	Cormet	1.1 (0.1, 7.2)				
Durom	Durom	3.8 (2.5, 6.0)	5.0 (3.3, 7.5)			
Icon	Icon	2.2 (0.3, 14.7)				
Mitch TRH	Mitch TRH					
Recap	Recap	4.8 (1.2, 17.8)	4.8 (1.2, 17.8)			

Note*: Cumulative Percent Revised equal to 0 indicates that the prosthesis combination has been followed up to this time with no revisions recorded*

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*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Hazard Ratio*	*P Value*	*Exact 95%CI*
Cementless								
F2L Multineck	Delta	99	6.1	126	4.8	3.30	0.004	(1.5, 7.3)
Margron	*	641	7.8	1833	2.7	3.07	<0.001	(2.3, 4.1)
Profemur Z	*	174	6.9	239	5.0	3.66	<0.001	(2.1, 6.5)
Revitan	*	85	7.1	263	2.3	2.56	0.022	(1.4, 5.7)
**	Artek	158	17.7	790	3.5	5.07	<0.001	(3.5, 7.4)
**	Inter-Op	27	22.2	130	4.6	5.82	<0.001	(2.6, 13.0)
**	MBA	64	9.4	239	2.5	2.87	0.010	(1.3, 6.4)
**	SPH Blind	748	5.7	2565	1.7	2.00	<0.001	(1.5, 2.7)
Cemented								
Elite Plus	Apollo	52	13.5	236	3.0	4.72	<0.001	(2.3, 10.0)
Elite Plus	Charnley LPW	89	10.1	376	2.4	3.46	<0.001	(1.8, 6.7)
H Moos	Mueller	19	36.8	76	9.2	13.70	<0.001	(6.5, 29.1)
Hybrid								
Cemented	**Cementless**							
C-Stem	Pinnacle	253	3.2	369	2.2	2.06	0.042	(1.0, 4.1)
**	MBA	50	10.0	105	4.8	5.43	<0.001	(2.3, 13.1)
**	SPH Blind	176	5.1	540	1.7	2.26	0.015	(1.2, 4.4)

Note: *Cementless components have been compared to all other cementless components*
Cemented components have been compared to all other cemented components
Hybrid components have been compared to all other Hybrid components where the femoral component is cemented and the Acetabular component is cementless

**= includes all models of acetabular components used with the listed femoral component*
***= includes all models of femoral components used with the listed acetabular component*

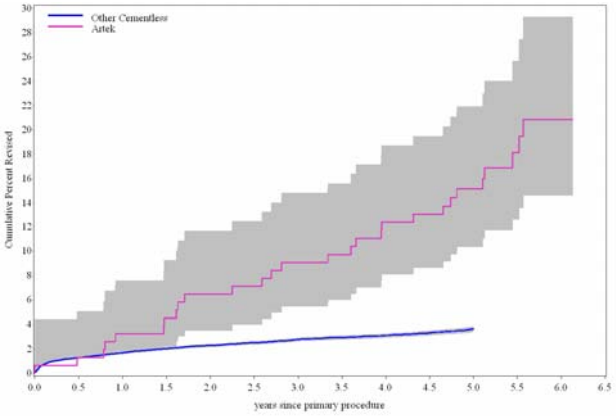
Table HT40: Yearly cumulative percentage revision of individual primary conventional total hip prostheses that have been identified as having a higher than anticipated revision rate

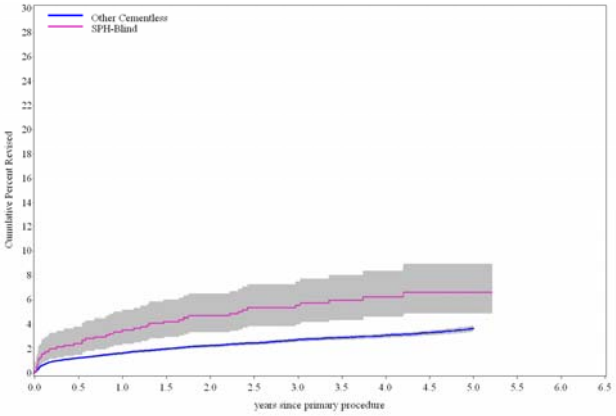
Femoral Component	*Acetabular Component*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
Cementless						
F2L Multineck	Delta	6.64 (3.02, 14.30)				
Margron	*	6.19 (4.54, 8.41)	7.36 (5.52, 9.78)	7.87 (5.93, 10.39)	8.67 (6.51, 11.49)	10.6 (7.43, 14.99)
Profemur Z	*	6.32 (3.43, 11.50)	8.66 (4.88, 15.15)			
Revitan	*	3.54 (1.16, 10.59)	7.16 (3.28, 15.25)	7.16 (3.28, 15.25)		
**	Artek	3.21 (1.35, 7.55)	6.44 (3.52, 11.64)	9.04 (5.46, 14.79)	12.4 (8.07, 18.69)	15.1 (10.32, 21.91)
**	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)	22.6 (10.82, 43.50)
**	MBA	4.69 (1.54, 13.83)	6.28 (2.40, 15.87)	7.92 (3.37, 18.00)	7.92 (3.37, 18.00)	
**	SPH Blind	3.53 (2.42, 5.14)	4.68 (3.37, 6.49)	5.51 (4.05, 7.47)	6.21 (4.60, 8.36)	6.61 (4.87, 8.94)
Cemented						
Elite Plus	Apollo	2.00 (0.28, 13.36)	4.00 (1.02, 15.06)	4.00 (1.02, 15.06)	8.04 (3.10, 20.03)	15.1 (6.74, 31.72)
Elite Plus	Charnley LPW	1.20 (0.17, 8.25)	4.86 (1.85, 12.44)	6.12 (2.59, 14.07)	9.96 (5.11, 18.95)	9.96 (5.11, 18.95)
H Moos	Mueller	5.56 (0.80, 33.36)	11.1 (2.90, 37.58)	33.3 (16.57, 59.65)	38.9 (20.79, 64.68)	38.9 (20.79, 64.68)
Hybrid						
Cemented	**Cementless**					
C-Stem	Pinnacle	2.58 (1.16, 5.68)	3.67 (1.64, 8.07)			
**	MBA	4.13 (1.05, 15.54)	9.48 (3.62, 23.59)	13.3 (5.56, 29.77)		
**	SPH Blind	4.07 (1.96, 8.35)	4.07 (1.96, 8.35)	4.82 (2.43, 9.44)	6.03 (3.09, 11.59)	6.03 (3.09, 11.59)

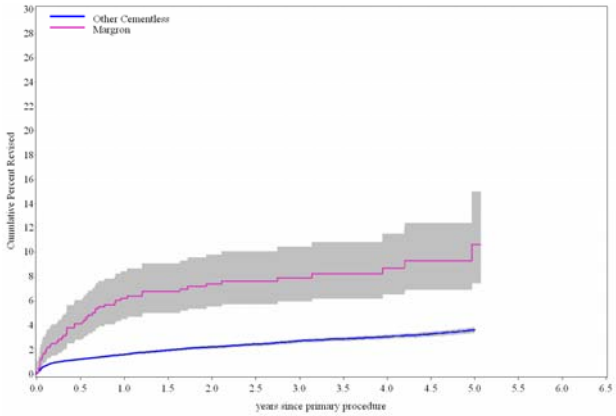
Table HT41: Yearly Usage of individual primary total hip prostheses that have been identified as having a higher than anticipated revision rate

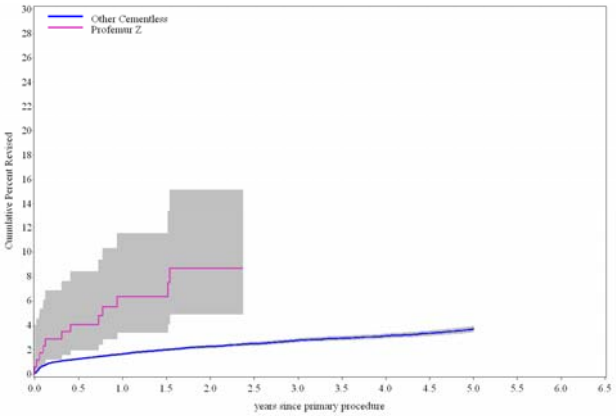
Femoral Component	*Acetabular Component*	*Year of Implant*							
		1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Cementless									
F2L Multineck	Delta						10	62	27
Margron	*		28	56	127	122	139	94	75
Profemur Z	*						41	78	55
Revitan	*				6	53	23	1	2
**	Artek	12	30	96	20				
**	Inter-Op		7	20					
**	MBA			7	36	20		1	
**	SPH Blind		24	90	192	227	152	30	33
Cemented									
Elite Plus	Apollo		9	16	17	10			
Elite Plus	Charnley LPW	3	19	23	29	15			
H Moos	Mueller		5	9	5				
Hybrid									
Cemented	**Cementless**								
C-Stem	Pinnacle					20	71	72	90
**	MBA			1	4	9	19	10	7
**	SPH Blind		7	24	36	34	51	10	14

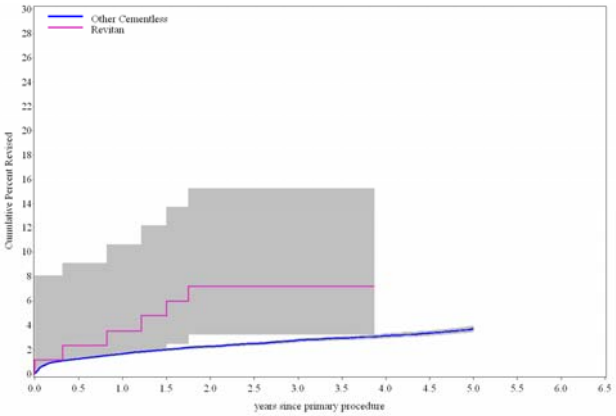
Figures HT24-HT29: Cumulative percentage revision of individual Cementless primary conventional total hip prostheses that have been identified as having a higher than anticipated revision rate.

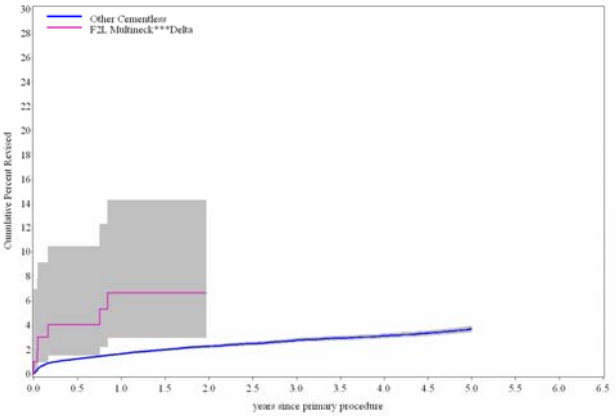




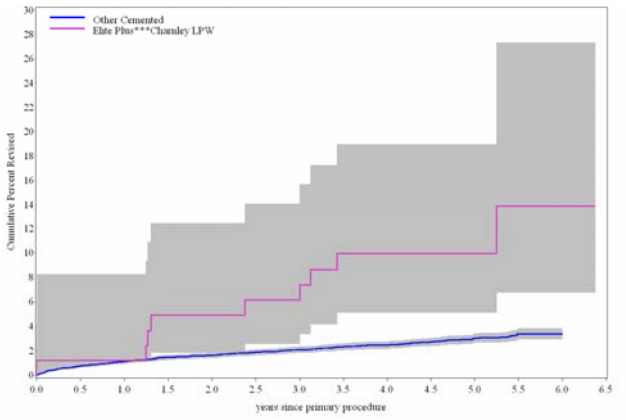








Figures HT30: Cumulative percentage revision of individual Cemented primary conventional total hip prostheses that have been identified as having a higher than anticipated revision rate.



Primary Resurfacing Hip Replacement Prostheses
with a higher than anticipated revision rate

Table HT42: Individual Primary Resurfacing Hip Prostheses with higher than anticipated revision rates either alone or in combination

Resurfacing Head	*Resurfacing Cup*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Hazard Ratio*	*P Value*	*Exact 95%CI*
ASR	ASR	753	4.1	1042	3.0	2.18	<0.001	(1.5, 3.2)
Durom	Durom	564	4.4	927	2.7	2.18	<0.001	(1.4, 3.3)
Cormet2000 (HAP)	Cormet	95	8.4	288	2.8	3.01	0.002	(1.5, 6.1)

Note: *resurfacing components have been compared to all other resurfacing components*

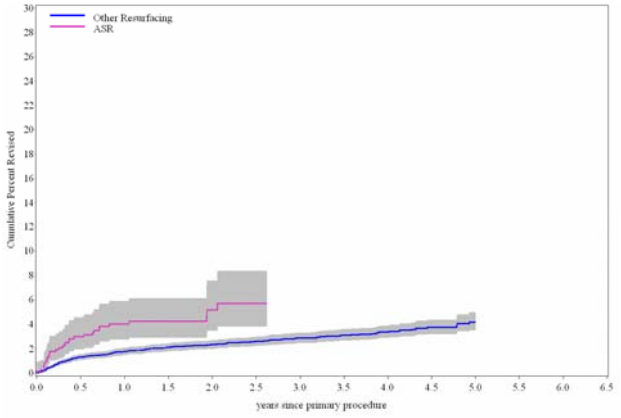
Table HT43: Yearly cumulative percentage revision of individual primary resurfacing hip prostheses that have been identified as having a higher than anticipated revision rate.

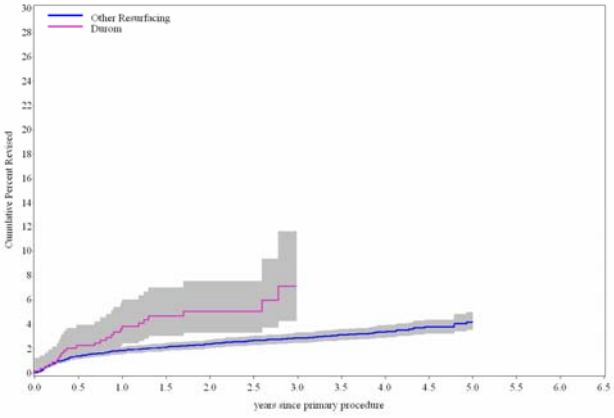
Resurfacing Head	*Resurfacing Cup*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
ASR	ASR	4.04 (2.78, 5.85)	5.16 (3.50, 7.56)			
Durom	Durom	3.84 (2.46, 5.97)	5.01 (3.33, 7.51)			
Cormet2000 (HAP)	Cormet	6.32 (2.89, 13.52)	7.37 (3.58, 14.84)	9.18 (4.61, 17.85)	9.18 (4.61, 17.85)	

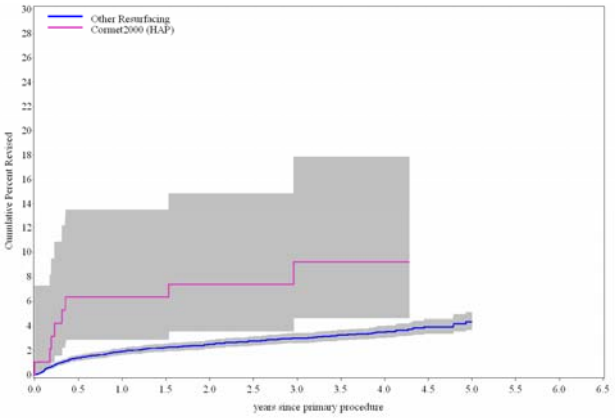
Table HT44: Yearly Usage of individual primary resurfacing hip prostheses that have been identified as having a higher than anticipated revision rate

Resurfacing Head	*Resurfacing Cup*	*Year of Implant*							
		1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
ASR	ASR					43	164	298	248
Durom	Durom					58	161	204	140
Cormet2000 (HAP)	Cormet			1	17	38	39		

Figures HT31-HT33: Cumulative percentage revision of individual primary resurfacing 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 20,150 revision hip procedures recorded by the Registry. Included in this group of revisions is a subgroup containing 3,482 first revisions of all known primary partial and primary total hip replacements. All have a procedure date prior to the end of 2006.

As previously mentioned the Registry categorises revisions into a number of different types. Revision procedures are either 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. When only one of the femoral or acetabular components are revised this is referred to as a partial major revision. If both are revised this is referred to as a total major revision. 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.

The major focus of this section of the report is to provide preliminary information on the outcome of the first revision of primary conventional total hip replacement. To achieve this effectively the Registry needs to have a full chronological list of procedures dating back to the original primary procedure. At this stage of the Registry's development it does not have data on the original primary for the majority of revisions it has recorded. This is because for most revision hip procedures the primary was performed prior to the commencement of the Registry. Not only is the Registry unaware of the original primary procedure it is not even certain if the first revision recorded, is the first revision procedure for that individual. As a consequence it is not possible to undertake an analysis of outcome based on the data of all revision procedures recorded by the Registry. Analysis of these data however is able to provide information on the types of revisions being undertaken, how that is changing and the reasons for those revisions.

There is however an increasing proportion of revision procedures where the Registry does have a record of the original primary and hence a full chronological list of all procedures subsequent to that primary. The Registry refers to this subgroup of revisions as "revisions of known primary procedures". These primary procedures may be partial or total hips. Currently this is 4,035 or 27.5% of all Registry recorded revisions, 3,482 of which are first revision procedures.

The outcome analysis is based on determining the rate of subsequent revision of first revisions of known primary hip replacements. The known primary procedures include primary partial, primary total and resurfacing hips.

Analysis of All Hip Revision Procedures

Type of revision hip procedures

Most revisions of hip procedures are major revisions (85% of all revisions). Of the major revisions 35.9% involve revision of both the femoral stem and acetabular cup or shell. Most major revisions however involve revision of only one major component (58.9%). When only one major component is revised it is most commonly the acetabular cup or shell (37.4% of all major revisions). Femoral stem only revisions account for 21.5% of all major revisions. There are a small number of major revisions where prostheses are removed and replaced by a cement spacer (2.6%), removed and not replaced (1.3%) or removed and reinserted (0.1%) (Table HR1).

Minor revisions account for 15% of all revision procedures. Most minor revisions involve exchange of both the head and insert (70.3%) (Table HR2).

During the last five years there has been an increase in the proportion of major partial

revisions and a decrease in the use of both minor and major total hip revision procedures. Although this trend is evident in most states and territories there are regional differences in relative proportion of each type of revision procedure. In 2006 major partial revision was the revision option used in over 50% of all revision procedures in all states except Queensland and South Australia. South Australia and Western Australia had the highest incidence of minor revision (23.2 % and 24.4% respectively) and Queensland the highest incidence of major total revision (44.9%) (Figure HR1).

Age and Gender

Revision hip replacement is more common in women. The proportion of women undergoing revisions has been increasing in recent years. This was first reported last year and in 2006 the number of women being revised further increased to 56.3% from 54.6% in 2005 (Table HR3).

There has been little change in the age of patients undergoing revision surgery with the major age group having revision procedures in 2006 being between 75 and 84 years of age (33.0%) (Table HR4).

Diagnosis

The most common reason for revision is loosening which is reported in almost half of all revisions (46.8%). Dislocation is the next most common reason (15.0%). Lysis is reported in 10.1%, fracture in 8.8% and infection in 8.6% of all revisions. Prosthesis wear and breakage were reported in 6.3% of all revisions. The total number of diagnoses exceeds the total number of procedures. This is because for some procedures there is more than one diagnosis provided. All diagnoses provided have been included in this analysis (Table HR5).

Analysis of first Revisions of known primary procedures

The essential difference between this subgroup of revisions compared to all revision procedures is that the primary and revision procedure must be within the Registry collection period, that is, within the last seven years. Therefore only to mid term revisions can be identified.

Type of revision hip procedures

There are differences in the type of revision procedure performed in the primary to revision group when compared to the all revision group. A smaller proportion of the revisions are major total revisions (25.2% compared to 35.9%). In contrast to the analysis of all revision procedures the major partial revisions involve revision of the femoral stem more often than the acetabular cup or shell (stem only 36.1% compared to 21.5% and acetabular cup or shell 28.7% compared to 37.4%). There are a higher proportion of minor revisions (23.7% compared to 15%). The most common minor revision involves the replacement of both the head and insert (60.8%). Head only revisions account for almost a quarter of minor revisions (Table HR6).

Cementless fixation is common when major components are used in the revision (Table HR6).

Diagnosis

There are differences in the reason for revision of known primaries when compared to all revisions. Loosening is still the most common reason but the proportion is less (29.2% compared to 46.8%). Other diagnoses such as dislocation, fracture and infection are more common in the first revision of the known primary group (Table HR5), reflecting the fact that known revisions are early or mid term revisions due to the limited follow up time.

Outcomes Revision Hip Replacement

This analysis examines the risk of subsequent revision following the first revision of a known primary conventional total hip replacement.

We have excluded first revisions with infection as the reason for the initial revision. Outcome analysis for infected total hip revisions is more complex than non infected revisions. There are many additional factors that need to be considered for example antibiotic

treatment, adequacy of debridement, infective organism(s) and revision strategy for example, planned multi-staged procedures. The Registry does not have information on all of these factors and meaningful interpretation of any subsequent revision data are difficult.

When revisions for primary hip procedures other than conventional primary hips are excluded, the number of procedures available for analysis decreases from 3,482 to 2,304. Excluding infection further reduces this to 2,041 procedures of which 200 (9.8%) have subsequently been revised.

Outcomes

For revisions of known conventional total hips the rate of subsequent revision is dependent on the type of the first revision performed. A greater proportion of minor revisions undergo subsequent revision compared to major total and major partial revisions (13.7%, 8.0% and 7.9% respectively). This is also evident in the revisions per 100 observed component years (6.4, 4.5 and 4.0) (Table HR8). At three years the cumulative percent revision of a minor revision is 17.8%, a major partial is 10.5% and a major total revision is 11.1% (Table HR9 and Figure HR2).

Further analysis has been undertaken examining effects of age, gender and fixation for the various types of revision. There does not appear to be any difference, however the number of procedures available for analysis is small and this precludes any meaningful interpretation of theses results (data not shown).

Revision Hip Replacement - 1/9/1999 to 31/12/2006

Prosthesis Fixation and Usage of All Revisions

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 *	2586	15.1	1106	6.4	.	.	.	.	3692	21.5
Acetabular Component Only*	4594	26.8	1822	10.6	.	.	.	.	6416	37.4
Femoral and Acetabular	3133	18.3	1197	7.0	1827	10.7	.	.	6157	35.9
Removal Prosthesis	.	.	.	.	.	.	227	1.3	227	1.3
Cement Spacer	.	.	.	.	.	.	445	2.6	445	2.6
Bipolar head and Femoral Comp	57	0.3	133	0.8	.	.	.	.	190	1.1
Reinsertion of Components	7	0.0	16	0.1	.	.	.	.	23	0.1
Total	**10377**	**60.5**	**4274**	**24.9**	**1827**	**10.7**	**672**	**3.9**	**17150**	**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	2109	70.3
Insert only	242	8.1
Head Only	425	14.2
Cable/Other Minor Components	224	7.5
Total	**3000**	**100.0**

Figure HR1: Trends in Types of Revision Procedure by State and Territory

Table HR3: Trends in Usage for Revision Hip Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	1694	54.3	1426	45.7	3120	100.0
2003	1870	54.5	1562	45.5	3432	100.0
2004	1847	53.4	1610	46.6	3457	100.0
2005	1905	54.6	1586	45.4	3491	100.0
2006	1934	56.3	1503	43.7	3437	100.0

Table HR4: 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*	*%*
2002	365	11.7	491	15.7	941	30.2	1024	32.8	299	9.6	3120	100.0
2003	333	9.7	583	17.0	1061	30.9	1137	33.1	318	9.3	3432	100.0
2004	350	10.1	565	16.3	1038	30.0	1177	34.0	327	9.5	3457	100.0
2005	327	9.4	569	16.3	1021	29.2	1211	34.7	363	10.4	3491	100.0
2006	351	10.2	601	17.5	1016	29.6	1134	33.0	335	9.7	3437	100.0

Diagnoses

Table HR5: Diagnosis - Revision Hip Replacement

Diagnosis	*All Revisions*		*1st Revision with known primary*	
	Number	*%*	*Number*	*%*
Loosening	10889	46.8	1096	29.2
Dislocation of Prosthesis	3489	15.0	1017	27.1
Lysis	2339	10.1	62	1.7
Fracture	2047	8.8	644	17.2
Infection	2012	8.6	490	13.1
Wear Acetabulum	772	3.3	23	0.6
Pain	468	2.0	151	4.0
Implant Breakage Acetabular	463	2.0	35	0.9
Implant Breakage Stem	206	0.9	15	0.4
Implant Breakage Head	31	0.1	12	0.3
Other	545	2.3	206	5.5
Total	**23261**	**100.0**	**3751**	**100.0**

Note: *some patients had multiple diagnoses*

Prosthesis Fixation of Revisions of Known Primary Hip

Table HR6: 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 *	651	24.5	308	11.6	.	.	.	.	959	36.1
Acetabular Component Only*	613	23.1	148	5.6	.	.	.	.	761	28.7
Femoral and Acetabular	291	11.0	143	5.4	234	8.8	.	.	668	25.2
Removal Prosthesis	.	.	.	.	.	.	52	2.0	52	2.0
Cement Spacer	.	.	.	.	.	.	129	4.9	129	4.9
Bipolar head and Femoral Comp	28	1.1	50	1.9	.	.	.	.	78	2.9
Reinsertion of Components	5	0.2	4	0.2	.	.	.	.	9	0.3
Total	**1588**	**59.8**	**653**	**24.6**	**234**	**8.8**	**181**	**6.8**	**2656**	**100.0**

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

Table HR7: Revisions of Known Primary Procedures - Minor Revision Hip Replacement

Components Used	*N*	*%*
Head/Insert	502	60.8
Insert only	51	6.2
Head Only	191	23.1
Cable/Other Minor Components	82	9.9
Total	**826**	**100.0**

Table HR8: Subsequent revision rates for major partial, major total and minor first revisions of known primary conventional 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	10	125	8.0	224	4.5	(2.14, 8.20)
Major Partial Revision	99	1254	7.9	2487	4.0	(3.23, 4.85)
Minor Revision	91	662	13.7	1419	6.4	(5.16, 7.87)
Total	**200**	**2041**	**9.8**	**4131**	**4.8**	**(4.19, 5.56)**

Figure: HR2: Cumulative percentage revision of Known Primary Conventional Total Hips by Type of first revision (excluding infection)

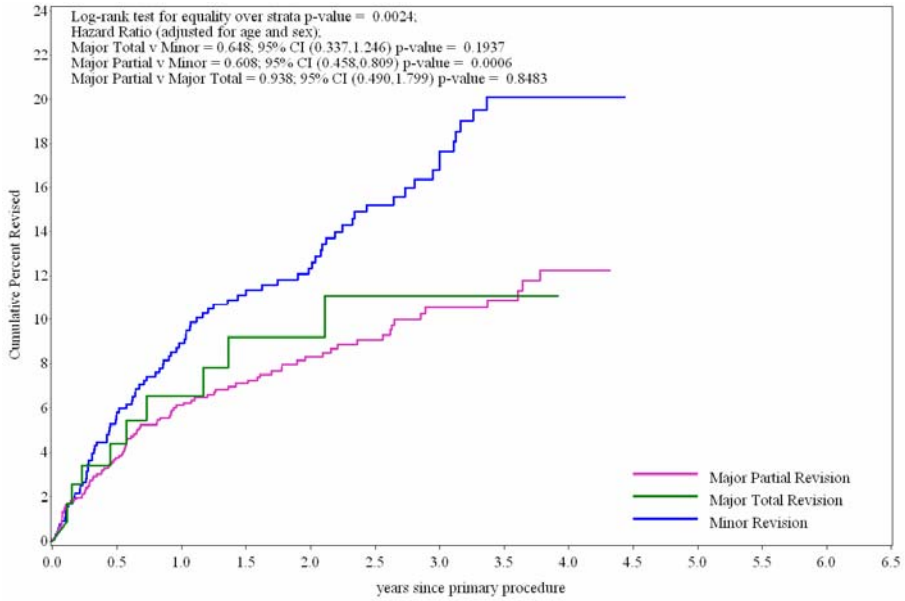


Table HR9: Yearly Cumulative percent revision of major partial, major total and minor first revisions of known primary conventional total hips (excluding infection as a cause of revision)

Type of revision hip replacement	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Major Total Revision	6.5 (3.2, 13.3)	9.2 (4.8, 17.1)	11.1 (5.9, 20.2)	
Major Partial Revision	6.1 (4.8, 7.7)	8.3 (6.7, 10.3)	10.5 (8.5, 13.0)	12.3 (9.8, 15.3)
Minor Revision	8.9 (6.9, 11.5)	12.3 (9.8, 15.4)	17.6 (14.3, 21.6)	20.1 (16.3, 24.6)

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 2006. There were 172,349 primary and revision knee procedures in this period. This is an additional 33,546 knee procedures compared to the 2006 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 prosthesis used. These include the unispacer (no longer used in Australia), patella/trochlear and unicompartmental knees as well as total knee replacement procedures. Revisions are re-operations of knee arthroplasty 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 minor revisions include patella replacement and/or tibial insert exchange.

Gender

In general, knee replacement is more common in women (56.0%). There are however gender variations depending on the type of procedure. Primary total knee and patella/trochlear replacement are performed more commonly in women (57.5% and 76.6% respectively). Unispacer and unicompartmental replacements are undertaken slightly more frequently in men (51.3% and 51.1% respectively). Revision procedures are undertaken slightly more commonly in women (51.9%) (Table KG1).

During the last five years, Registry data indicate that there has been a small increase in the proportion of women receiving unicompartmental knee replacement (Figure KG1).

Age

The mean age for all knee replacement procedures is 68.8 years (females: 69.1 years, males: 68.5 years). Primary unispacer, patella/trochlear and unicompartmental knees are generally used in younger individuals compared to primary total knees (unispacer 54.6 years; patella/trochlear 59.2 years; unicompartmental 65.6 years; and total 69.3 years) (refer 2007 Supplementary Report www.aoa.org.au).

Although patella/trochlear and unicompartmental knee replacements are performed more commonly in younger individuals there is a large number of older people undergoing these procedures. The number in the 65 years or older age group varies depending on the type of procedure; unispacer 10.3%, patella/trochlear 33.0% and unicompartmental 53.7%, this compares to 70.5% for primary total knee replacements (Table KG2). The mean age for revision procedures is 69.6 years (refer 2007 Supplementary Report www.aoa.org.au).

Over the last five years there has been a small increase in the proportion of primary knee replacements undertaken in those less than 65 years of age. This is true for both unicompartmental and total knee replacements although the change is slightly greater for unicompartmental knee replacement (Figure KG2).

Diagnosis

The indication for almost all primary knee replacement procedures is osteoarthritis (unispacer 100%, patella/trochlear 99.2%, unicompartmental 98.8% and primary total knee replacement 96.7%). The principal cause for revision knee replacement is aseptic loosening (37.1%) (refer 2007 Supplementary Report www.aoa.org.au)

Use of different Categories of Knee Replacement

The most common knee procedure is a primary total knee replacement (78.2%). The proportion of other knee procedures is 12.8% for unicompartmental, 0.5% for patella/trochlear and 8.5% for revision procedures (Table KG1). Only 39 unispacer procedures have been recorded by the Registry.

The proportion of all knee replacement procedures that are primary total knee replacements has increased from 76.8% in 2001 to 81.0% in 2006. The proportion of unicompartmental knees has decreased from a high of 15.2% in 2002 to 10.8% in 2006. Revision procedures have decreased from 9.3% in 2001 to 8.2% in 2005. There has been no change to the proportion of revision procedures in 2006 (Figure KG3).

State and Territory Variation in Use

There is some variation by region in the proportional use of knee procedures. All states have shown a decrease in the use of unicompartmental knees with the exception of the ACT/NT. The territories are also the only regions where the proportion of primary total knee replacement has not increased as a proportion of all knee procedures.

In most states the proportion of revision procedures continued to decline with the exception of NSW where it increased from 7.0% in 2005 to 7.5% in 2006, Tasmania (5.4% in 2005 to 6.1% in 2006) and ACT/NT (7.7% in 2005 to 11.3% in 2006 (Figure KG3).

Bilateral Primary Knee procedures

The Registry defines bilateral procedures as when both knees have undergone primary knee replacement no matter what the type of primary procedure is or the timing of the second knee operation. The Registry has recorded 25,219 individuals with bilateral knee procedures, 26.7% of which 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 76.6% of all same day bilateral procedures. Of the remaining same day bilateral procedures 19.6% are bilateral unicompartmental knee replacements (Table KG3).

General Comparison of Outcomes

When looking at the number of revisions per 100 observed component years, total knee replacements are the least revised of all primary knee procedures (total 0.9, unicompartmental 2.0, patella/trochlear 3.2, and unispacer 38.6) (Table KG4).

Comparison of the cumulative percent revision further highlights the difference in the risk of revision for each of these procedures. At five years the cumulative percent revision of primary total knee procedures is 3.6% and unicompartmental is 8.9%. The cumulative percent revision of patella/trochlear knee procedures is 13.0% at four years. The cumulative percent revision of unispacer procedures to three years is 62.4% (Table KG5).

Knee Replacement - 1/9/1999 to 31/12/2006

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	650	76.6	199	23.4	849	0.5
Unicompartmental Knee	10766	48.9	11242	51.1	22008	12.8
Primary Total Knee	77537	57.5	57262	42.5	134799	78.2
Revision Knee	7611	51.9	7043	48.1	14654	8.5
Total	**96583**	**56.0**	**75766**	**44.0**	**172349**	**100.0**

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

Figure KG1: Percentage (Female) for both Unicompartmental and Primary Total Knee Replacement by Year

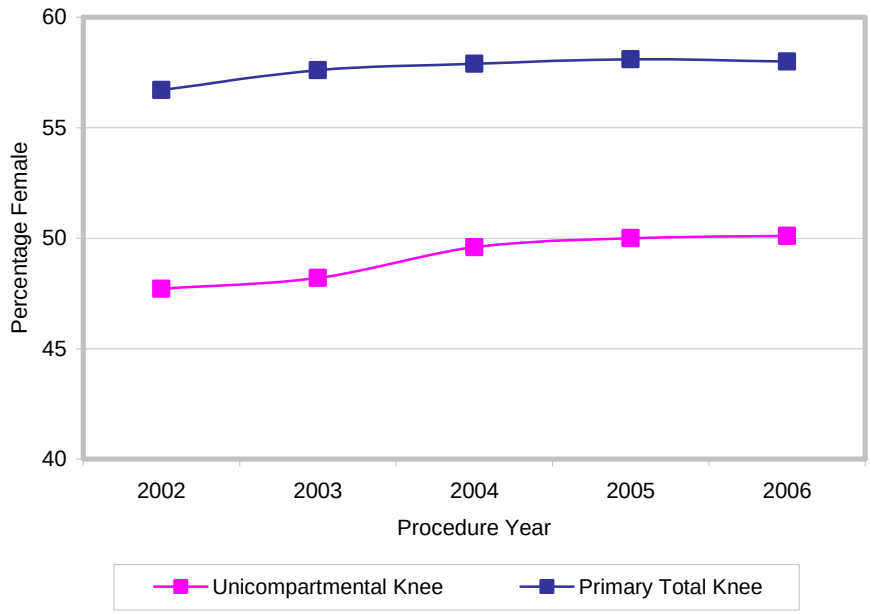


Table KG2: Summary statistics for All Knee Replacements by Age

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	325	38.3	244	28.7	160	18.8	105	12.4	15	1.8	849	0.5
Unicompartmental	3052	13.9	7121	32.4	7112	32.3	4316	19.6	407	1.8	22008	12.8
Primary Total Knee	8995	6.7	30772	22.8	50932	37.8	39794	29.5	4306	3.2	134799	78.2
Revision Knee	1278	8.7	3068	20.9	4888	33.4	4751	32.4	669	4.6	14654	8.5
Total	**13668**	**7.9**	**41222**	**23.9**	**63095**	**36.6**	**48967**	**28.4**	**5397**	**3.1**	**172349**	**100.0**

Figure KG2: Percentage (Age <65 years) for both Unicompartmental and Primary Total Knee Replacement by Year

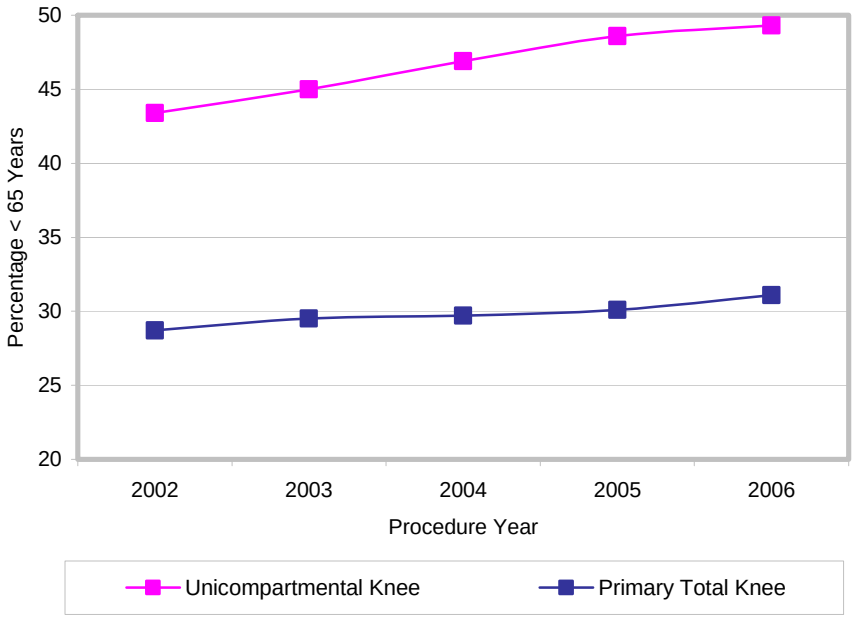


Figure KG3: Trends in Usage of Unicompartmental, Primary Total and Revision Knee Replacement by State and Territory

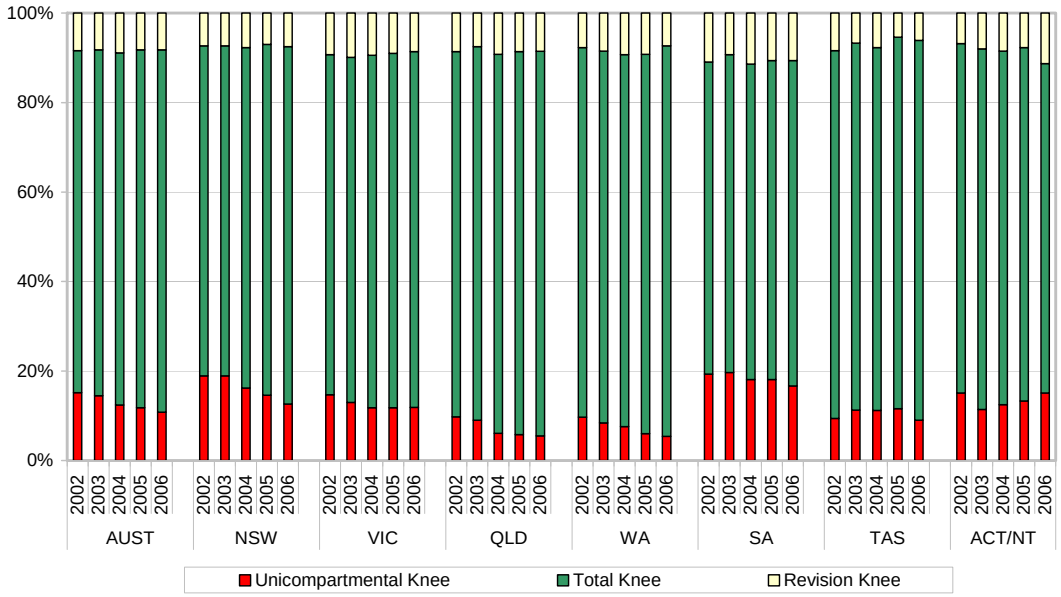


Table KG3: Days Between Procedures for Bilateral Primary Knees

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	92	0.4	4	0.0	14	0.1	27	0.1	1	0.0	138	0.5
Both Primary Total	5152	20.4	386	1.5	3171	12.6	10344	41.0	1842	7.3	20895	82.9
Both Unicompartmental	1321	5.2	72	0.3	427	1.7	937	3.7	174	0.7	2931	11.6
Patella/trochlear & Primary Total Knee	4	0.0	1	0.0	1	0.0	13	0.1	7	0.0	26	0.1
Patella/trochlear & Unicompartmental	.	.	.	.	.	.	5	0.0	1	0.0	6	0.0
Primary Total Knee & Primary Unispacer	.	.	.	.	1	0.0	.	.	.	.	1	0.0
Unicompartmental & Primary Total	161	0.6	12	0.0	90	0.4	696	2.8	259	1.0	1218	4.8
Unicompartmental & Primary Unispacer	.	.	.	.	1	0.0	3	0.0	.	.	4	0.0
Total	6730	26.7	475	1.9	3705	14.7	12025	47.7	2284	9.1	25219	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	62	38.6	(24.72, 57.41)
Patella/Trochlear	67	849	7.9	2082	3.2	(2.49, 4.09)
Unicompartmental	1237	22008	5.6	61313	2.0	(1.91, 2.13)
Primary Total	3071	134799	2.3	354921	0.9	(0.83, 0.90)
Total	**4399**	**157695**	**2.8**	**418377**	**1.1**	**(1.02, 1.08)**

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*	*5 years*
Unispacer	41.0 (27.5, 58.0)	59.0 (44.2, 74.3)	62.4 (47.3, 77.5)		
Patella/Trochlear	3.2 (2.2, 4.8)	6.0 (4.4, 8.1)	10.2 (7.9, 13.2)	13.0 (10.1, 16.7)	
Unicompartmental	2.3 (2.1, 2.6)	4.6 (4.3, 4.9)	6.2 (5.9, 6.6)	7.6 (7.1, 8.0)	8.9 (8.4, 9.5)
Total Knee	1.0 (1.0, 1.1)	2.1 (2.1, 2.2)	2.8 (2.7, 2.9)	3.3 (3.2, 3.4)	3.6 (3.5, 3.8)

Unispacer and Patella/Trochlear Prostheses

Unispacer and patella/trochlear procedures along with unicompartmental knee replacements are partial knee replacement procedures that involve surgery to a single knee compartment.

No unispacer procedures were undertaken in Australia in 2006. Patella/trochlear procedures increased from 675 to 849 procedures in this period.

Unispacer

Only two types of unispacer prostheses have ever been used in Australia. They are the Zimmer UniSpacer and InterCushion (Advanced Biosurfaces Inc.) (Table KUP1). The unispacer prosthesis was last recorded by the Registry in April 2005 and neither of these prostheses is currently listed on the Australian Prostheses Schedule.

The Registry first reported on the use of the unispacer prosthesis in the 2004 Annual Report. Although numbers were small it was evident even at that early time that their use was associated with a high early revision rate.

Current Registry information is still based on only a small number of procedures, 39 in total (Table KUP1). Unispacer procedures are performed on younger patients compared to other forms of knee arthroplasty. Almost half of the procedures were undertaken on individuals under the age of 55 years (46.2%) and most of the remainder were between 55 and 64 years (43.6%). The procedure was performed slightly more often in males (51.3%) (Table KG1 and Table KG2).

Of the 39 unispacer procedures in the Registry, 24 have been revised. At three years the cumulative percent revised for all unispacer procedures is 62.4% (Zimmer UniSpacer (57.6 %), InterCushion (77.8%) Table KG5 and K UP3, Figure KUP1). Major reasons for revision were pain 28.6%, synovitis 17.9% and loosening 14.3% (data not shown).

Patella/Trochlear

Patella/trochlear procedures are more common in females (76.6%) (Table KG1) and used most frequently in younger individuals with 67% below 65 years and 38.3% below 55 years. However, a small number of older individuals do undergo this procedure with 14.2% aged over 75 years (Table KG2).

There has been one new patella/trochlear prosthesis used in 2006 in addition to the seven reported last year. These have been combined with fourteen different patella prostheses. Occasionally, in this type of procedure a patellar component is not used (1.6%) (Table KUP4).

The Avon, LCS and Lubinus Patella Glide are used most often and account for 78.4% of all patella/trochlear procedures.

There is an age variation in the rate of revision for patella/trochlear procedures. Both the under 55 years and the 55-64 year age groups have a revision rate of 3.7 per 100 observed component years. This declines to 2.3 for the 65-74 year age group and then further reduces to 1.9 revisions per 100 observed component years for the 75 and older age group (Table KUP5).

Almost 8% of all patella/trochlear procedures recorded by the Registry have been revised. Compared to other categories of knee prostheses, patella/trochlear replacements have the highest rate of revision per 100 observed component years (3.2) with the exception of unispacer prostheses (Table KUP6 and KG4).

The cumulative percent revised at 4 years for patella/trochlear replacements is 13.0% (Table KUP7). The major reasons for revisions were loosening 18.1%, pain 18.1% and progression of disease 15.3% (data not shown).

The Avon is revised least often (Table KUP6). At five years the cumulative percent revised for this prosthesis is 8.5%, 95%CI (4.9, 14.4) (Table KUP7). The LCS has over twice the risk of revision of the Avon with a cumulative percent revision of 17.2% 95%CI (11.7, 24.9) at three years (Table KUP7) (hazard ratio (adjusted for age and sex) LCS vs Avon = 2.25; 95%CI (1.33, 3.84) P=0.00027).

The Lubinus Patella Glide has a cumulative percent revision of 10.2%, 95%CI (5.5, 18.4) at four years (Table KUP8), which is not significantly different from Avon.

Individual cumulative percentage revision curves for these three prostheses have been presented (Figures KUP3, KUP4 and KUP5).

There appears to be 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 31/12/2006

Unispacer Prosthesis Usage

Table KUP1: Prosthesis Usage - Unispacer

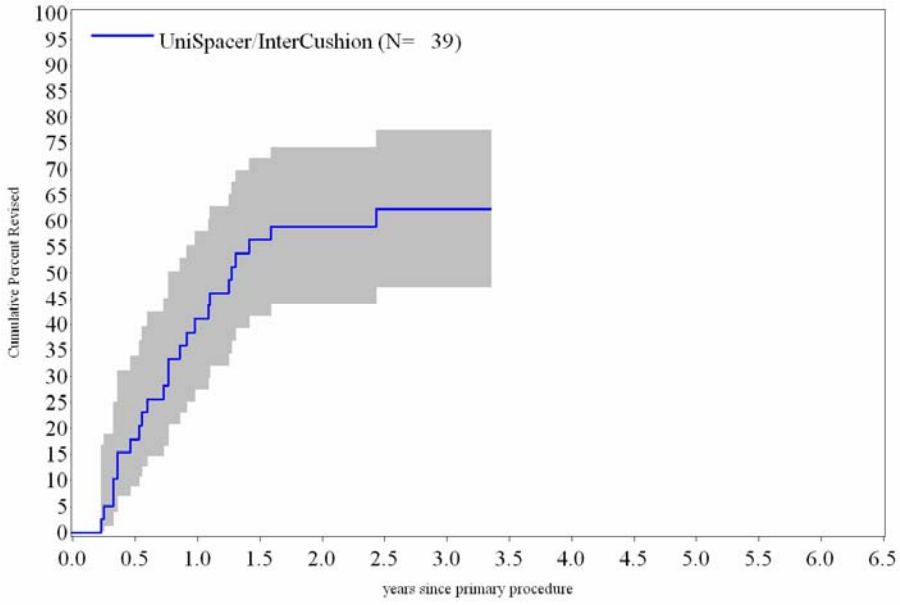
Unispacer	*Number*	*%*
InterCushion	9	23.1
UniSpacer	30	76.9
Total	**39**	**100.0**

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	11	63.6	(25.56, 131.0)
UniSpacer	17	30	56.7	51	33.2	(19.35, 53.17)
Total	**24**	**39**	**61.5**	**62**	**38.6**	**(24.72, 57.41)**

Figure KUP1: Cumulative percentage revision of Unispacer



Unispacer	*Number at risk at start of the period*										
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*
UniSpacer/InterCushion	39	32	23	17	15	10	5	1	0	0	0

Table KUP3: Yearly cumulative percentage revision of Unispacer

Unispacer	*Cumulative Percent Revised (95% CI)*		
	1 year	*2 years*	*3 years*
InterCushion	44.4 (19.5, 79.6)	77.8 (48.7, 96.6)	77.8 (48.7, 96.6)
Zimmer UniSpacer	40.0 (25.0, 59.5)	53.3 (37.0, 71.6)	57.6 (40.7, 75.6)
All Unispacers	41.0 (27.5, 58.0)	59.0 (44.2, 74.3)	62.4 (47.3, 77.5)

Patella/trochlear Replacement

Prosthesis Usage

Table KUP4: Prosthesis Usage - Patella/trochlear Replacement

Patella/trochlear replacement	*Patella*	*Number*	*%*
Avon	Kinemax Plus	223	26.3
	Avon	68	8.0
	-	4	0.5
	Nexgen	2	0.2
	Duracon	1	0.1
LCS	LCS (all Poly)	243	28.6
	-	5	0.6
	PFC Sigma	3	0.4
	Nexgen	1	0.1
	Nexgen MBK	1	0.1
	Scorpio	1	0.1
Lubinus Patella Glide	Duracon	77	9.1
	Lubinus Patella Glide	37	4.4
RBK	RBK	65	7.7
	Nexgen	4	0.5
	-	2	0.2
	Natural Knee II	1	0.1
MOD III	MOD III	62	7.3
	LCS	4	0.5
	-	1	0.1
	Genesis II	1	0.1
Themis	Themis	35	4.1
	-	1	0.1
	Nexgen	1	0.1
Competitor	Genesis II	5	0.6
Global Custom Made	-	1	0.1
Total		**849**	**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

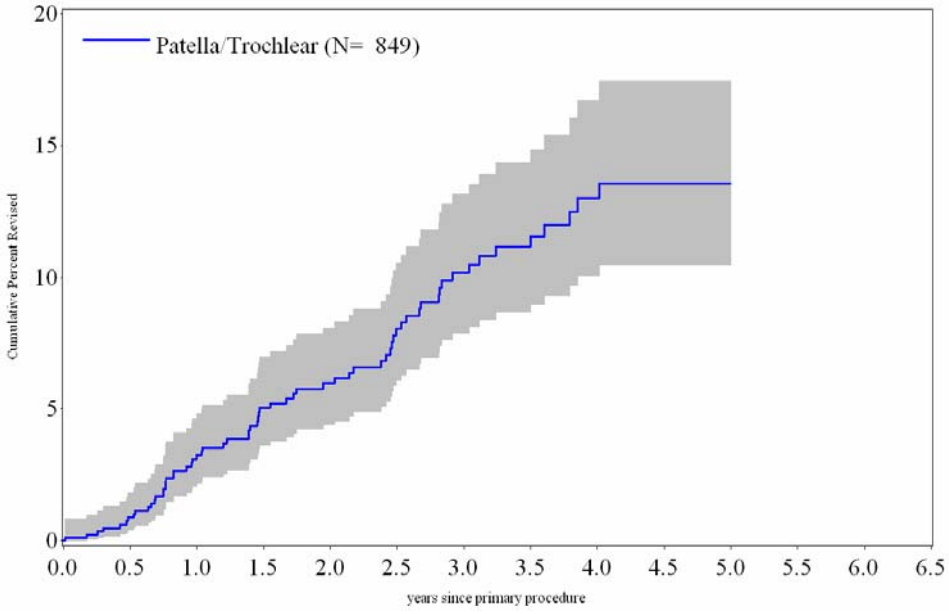
Table KUP5: Patella/Trochlear Procedures Requiring Revision by Age

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<55	31	325	9.5	844	3.7	(2.50, 5.21)
55-64	22	244	9.0	590	3.7	(2.34, 5.65)
65-74	9	160	5.6	387	2.3	(1.06, 4.42)
>=75	5	120	4.2	261	1.9	(0.62, 4.47)
Total	**67**	**849**	**7.9**	**2082**	**3.2**	**(2.49, 4.09)**

Table KUP6: 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	16	298	5.4	792	2.0	(1.16, 3.28)
Competitor	0	5	0.0	0	0.0	(0.00, 1321)
Global Custom Made	0	1	0.0	4	0.0	(0.00, 91.41)
LCS	28	254	11.0	535	5.2	(3.48, 7.56)
Lubinus Patella Glide	10	114	8.8	319	3.1	(1.50, 5.76)
MOD III	9	68	13.2	266	3.4	(1.54, 6.41)
RBK	2	72	2.8	76	2.6	(0.32, 9.53)
Themis	2	37	5.4	89	2.2	(0.27, 8.08)
Total	**67**	**849**	**7.9**	**2082**	**3.2**	**(2.49, 4.09)**

Figure KUP2: Cumulative percentage revision of Patella/Trochlear

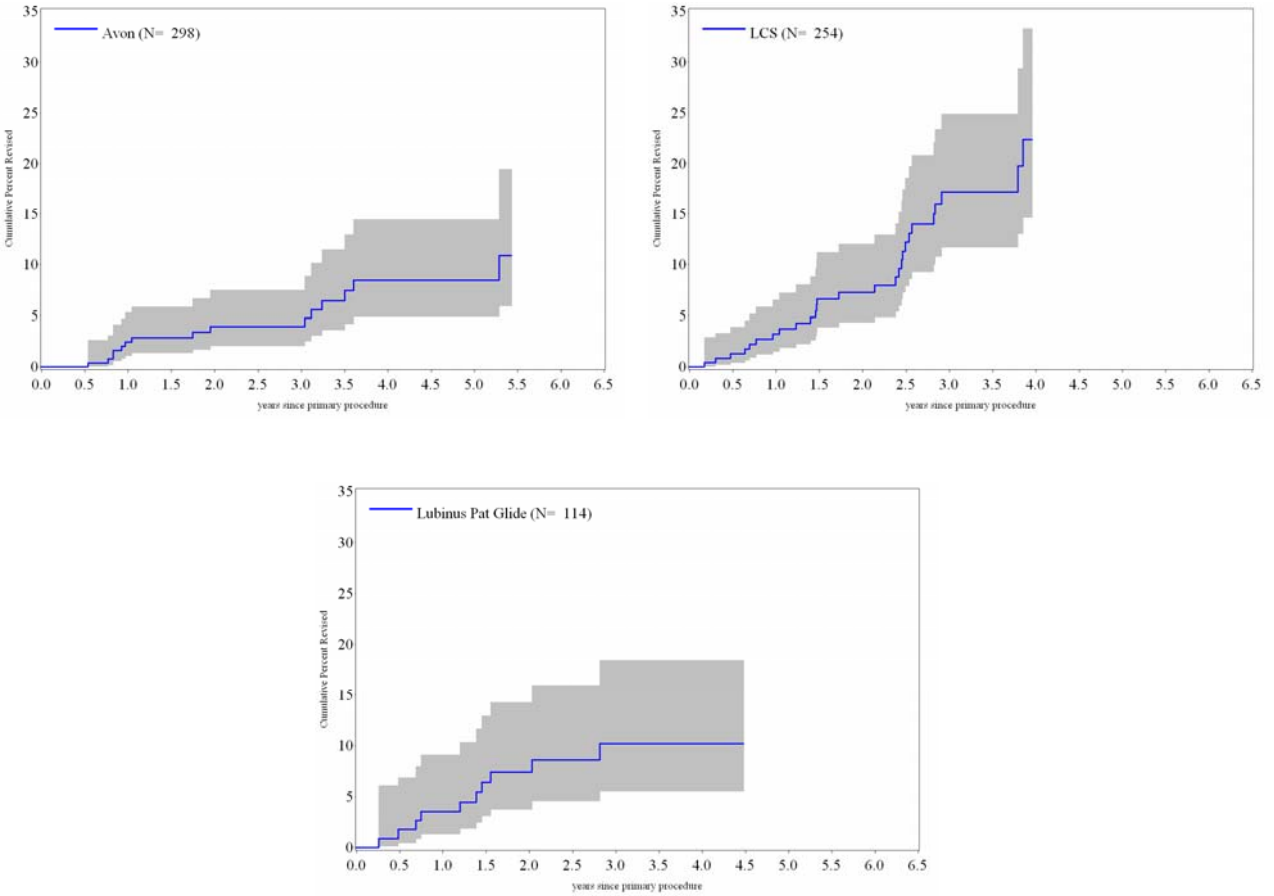


Patella/trochlear	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Patella/Trochlear	849	761	659	553	478	373	296	225	155	104	74	44	23

Table KUP7: Yearly cumulative percentage revision of Patella/Trochlear

Patella/trochlear	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Patella/Trochlear	3.2 (2.2, 4.8)	6.0 (4.4, 8.1)	10.2 (7.9, 13.2)	13.0 (10.1, 16.7)

Figures KUP3 - 5: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Avon	298	272	228	195	168	141	121	96	77	63	45	27	11
LCS	254	226	191	156	140	99	68	47	21				
Lubinus Pat Glide	114	112	109	95	77	61	50	38	22	10	6		

Table KUP8: Yearly cumulative percentage revision of Patella/Trochlear

Patella/trochlear	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Avon	2.4 (1.1, 5.3)	3.9 (2.1, 7.5)	3.9 (2.1, 7.5)	8.5 (4.9, 14.4)	8.5 (4.9, 14.4)
LCS	3.2 (1.5, 6.6)	7.3 (4.3, 12.0)	17.2 (11.7,24.9)		
Lubinus Pat Glide	3.5 (1.3, 9.1)	7.4 (3.8, 14.3)	10.2 (5.5, 18.4)	10.2 (5.5, 18.4)	

Unicompartmental Knee Replacement

This report is based on the analysis of 22,008 unicompartmental knee procedures recorded by the Registry with a procedure date prior to the end of December 2006.

Usage

The use of unicompartmental knee replacement during 2006 has continued to decline not only in respect to the proportion of knee procedures undertaken but also in absolute numbers.

The proportion of all knee procedures that were unicompartmental knee replacements declined from 15.2% in 2002 to 10.8% in 2006 (Figure KG3). The number of procedures undertaken in 2006 (3,569) were the lowest since 2003 when the Registry first reported on full national data. (Table KU1)

Changes in use with Gender and Age

There has been a reduction in the proportion of individuals over 65 years of age receiving unicompartmental knee replacement, 56.6% in 2002 to 50.7% in 2006.

When considering the different age groups, over a third of all unicompartmental knee replacements are undertaken in individuals between 55 and 64 years of age, almost 1 in 5 individuals however are over 75 years old (Table KU2 and KU3).

Fixation

Cementing both femoral and tibial components is the most common method of fixation, however, the proportion has decreased from 89.6% in 2005 to 86.8% in 2006 (Table KU4 and Figure KU2). The use of both femoral and tibial cementless components is the next most used method of fixation and has increased from 9.6% to 12.1% in the same period. Hybrid fixation was used in only 1.1% of unicompartmental procedures during 2006.

There is state and territory variation in the type of fixation used. Queensland, Western Australia and ACT/NT have over 95% cement fixation, in contrast to Victoria where 63.8% of procedures are cemented. South Australia is the only state where hybrid fixation has been used to any extent in 2006, accounting for 4.8% of procedures undertaken in this state (Figure KU2).

Types of Prostheses Used

The Registry has information on 21 different types of unicompartmental prostheses. Eighteen of these were used in 2006 and there were no additional unicompartmental prostheses used. The ten most frequently used prostheses account for 89.4% of all unicompartmental procedures (Table KU1).

Since the Registry commenced data collection, the Oxford 3 has been the most used prosthesis. There has been a continual decline in its proportional use since 2001 (40.9% in 2002 to 29.3% in 2006) (Figure KU1). The Unix and Active Knee have shown increased usage in the past twelve months, and the ZUK introduced in 2005, is now one of the more frequently used prosthesis.

Outcomes of Unicompartmental Knee Replacement

Of the 22,008 unicompartmental knee replacements recorded by the Registry 1,237 (5.6%) have been revised with 2.0 revisions per 100 observed component years. At one year the cumulative percent revised is 2.3% and at five years it is 8.9% (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

The risk of revision surgery for unicompartmental knee replacement is affected by age and this effect differs within males and females.

The five year cumulative percent revised decreases with age. Of those patients

under 55 years at the time of the primary procedure, 13.3% are revised by five years. The five year cumulative percent revised then progressively decreases with successive age groups to the over 75 age group which has a cumulative percent revised of 5.6% (Tables KU5, KU6 and Figure KU3).

Overall, women have a higher rate of revision than men, although this is not statistically significant (Figure KU4).

Men younger than 55 years of age have a non-significant higher revision rate than women in the same age group. However, between the ages of 65 and 74 years, women have a significantly higher revision rate than men (hazard ratio = 1.369; 95%CI(1.11, 1.69) P=0.003) (data not shown).

There is no difference in the revision rate of men and women between the ages of 55 and 64 (2.3) and over 75 years (1.3) (Table KU9 and KU10; Figure KU5 and KU6).

Variation with Fixation

There is no significant difference in the revision rate depending on the method of fixation (data not shown). Caution should be used in the interpretation of the similarity in outcome independent of fixation. 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 large numbers, namely the HA coated Unix. A comparison of cementless and cemented fixation for unicompartmental knees is therefore largely a comparison of the Unix with other cemented unicompartmental knee prostheses. As such it is not a comparison of methods of fixation.

Outcome of Specific Types of Prostheses

The percentage revised and the number of revisions per 100 observed component years are provided for all unicompartmental prostheses in Table KU11.

With respect to revisions per 100 observed component years the least revised prosthesis is the ZUK but this has only been used for a short period of time. The next least revised prosthesis is the Active Knee with 1.3 revisions per 100 observed component years. As with the ZUK, this particular prosthesis has a very short follow up so there should be considerable caution in the interpretation of these results (Table KU11).

When comparing the number of revisions per 100 observed component years and considering only those prostheses with more than 1,000 observed component years the least revised are Repicci (1.4), M/G (1.5) and Unix, GRU and Endo-Model Sled all with 1.8 revisions per 100 observed component years (Table KU11).

Cumulative percentage revision curves for individual unicompartmental prostheses with 250 or more procedures have been provided for comparison (Figures KU7-17). Yearly cumulative percent revised for all unicompartmental prostheses are provided in Table KU13.

Unicompartmental prostheses with a higher than anticipated rate of revision

The Registry compares outcomes for specific prostheses by undertaking a statistical comparison of revision rates of individual prostheses against the overall rate for all prostheses in the relevant category. For a number of years the Registry has discussed the potential difficulties of this approach with unicompartmental knee replacements.

The relatively small number of different types of prostheses, dominance in use of some prostheses, and the widely varying revision rates make the comparison of outcomes of specific prostheses difficult.

The approach taken in the last annual report was to undertake three different types of analyses. One analysis was to compare all prostheses to the Oxford 3, which is the most used prosthesis. Another was to compare all prostheses to the combined result of the three prostheses used in over 1,000 procedures. Each of these was identified as having a significantly lower rate of revision than

the Oxford 3. The standard algorithm used by the Registry for all other categories of prostheses was also used.

This year the Registry has used two of these approaches. They are the comparison of individual prostheses to the Oxford 3 and the standard approach used for all other categories of joint replacement.

The reason the Registry has not undertaken the comparison to those prostheses identified as having a significantly lower rate of revision than the Oxford 3 is because the Unix no longer falls into this category and the Repicci and the M/G have declined in use in 2006 (refer to Table KU1).

When comparing the revision rates of individual prostheses to the Oxford 3 they fall into three categories: those that have a significantly higher rate of revision compared to the Oxford 3; those that have a significantly lower rate; and those where the rate is not significantly different.

Three prostheses have a significantly higher revision rate than the Oxford 3. They are the Advance (hazard ratio = 4.801; 95%CI(2.27, 10.14) P<0.0001), AMC (hazard ratio = 1.982; 95%CI(1.37, 2.88) P=0.0003), and the Preservation Mobile (hazard ratio = 1.951; 95%CI(1.48, 2.57) P<0.0001).

Two prostheses have a significantly lower rate of revision compared to the Oxford 3. They are the Repicci (hazard ratio = 0.697; 95%CI(0.56, 0.87) P=0.0012) and the M/G (hazard ratio = 0.710; 95%CI(0.56, 0.90) P=0.0046). The revision rates for all the remaining unicompartmental prostheses were not significantly different from the Oxford 3 (Table KU12).

Using the standard Registry algorithm to identify prostheses with more than twice the risk of revision compared to other prostheses in the same category, the Registry identified the same three prostheses that had a significantly higher rate of revision compared to the Oxford 3. They are the Advance (hazard ratio (adjusted for age and sex) vs other unicompartmental = 4.95; 95%CI(2.4, 10.4) P<0.001), the AMC (hazard ratio (adjusted for age and sex) vs other unicompartmental = 2.12; 95%CI (1.5, 3.0) P<0.001), and the Preservation Mobile (hazard ratio (adjusted for age and sex) vs other unicompartmental = 2.14; 95%CI (1.6, 2.8) P<0.001) (Table KU14).

The cumulative percent revised at three years for the Advance is 25.3%, the AMC is 13.4% and the Preservation Mobile is 15.5%. The cumulative percent revision of the Preservation Mobile at four years is 17.5%, compared 7.9% for the Oxford 3 (Table KU16).

Unicompartmental Knee Replacement - 1/9/1999 to 31/12/2006

Prosthesis Usage

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

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Oxford 3 (1579)	Oxford 3 (1365)	Oxford 3 (1139)	Oxford 3 (1101)	Oxford 3 (1046)
2	Repicci (579)	Repicci (426)	Repicci (389)	Preserv-Fixed (334)	Unix (341)
3	Allegretto Uni (374)	Preserv-Fixed (371)	Preserva-Fixed (364)	Genesis (300)	Genesis (284)
4	M/G (333)	M/G (349)	M/G (363)	M/G (297)	ZUK (284)
5	Preserv-Fixed (294)	Allegretto Uni (337)	Genesis (297)	GRU (293)	Active Knee (278)
6	Unix (236)	GRU (318)	GRU (289)	Unix (267)	Preserv-Fixed (249)
7	Preservation-Mobile (150)	Genesis (276)	Unix (238)	Repicci (259)	GRU (215)
8	Genesis (129)	Unix (260)	Allegretto Uni (190)	Active Knee (223)	M/G (179)
9	GRU (46)	Preserv-Mobile (121)	Endo-Model Sled (177)	Endo-Model Sled (208)	Repicci (170)
10	Natural Knee (42)	Endo-Model Sled (101)	AMC (65)	Allegretto Uni (166)	Endo-Model Sled (144)
% using 10 most common	97.5%	96.2%	95%	89.9%	89.4%
Total N Procedures	3859	4079	3694	3836	3569
Total N Prosthesis Types	16	16	16	18	18

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

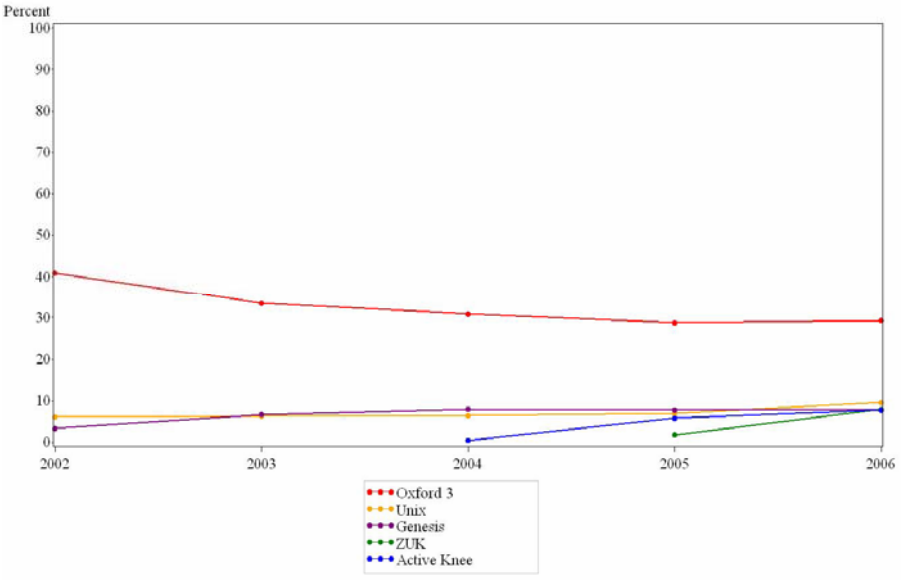


Table KU2: Usage of Unicompartmental Knee Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	1841	47.7	2018	52.3	3859	100.0
2003	1966	48.2	2113	51.8	4079	100.0
2004	1831	49.6	1863	50.4	3694	100.0
2005	1918	50.0	1918	50.0	3836	100.0
2006	1789	50.1	1780	49.9	3569	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*	*%*
2002	515	13.3	1161	30.1	1307	33.9	807	20.9	69	1.8	3859	100.0
2003	518	12.7	1318	32.3	1351	33.1	816	20.0	76	1.9	4079	100.0
2004	509	13.8	1225	33.2	1124	30.4	766	20.7	70	1.9	3694	100.0
2005	550	14.3	1316	34.3	1184	30.9	711	18.5	75	2.0	3836	100.0
2006	543	15.2	1218	34.1	1117	31.3	613	17.2	78	2.2	3569	100.0

Table KU4: Prosthesis Fixation - Unicompartmental Knee Replacement

Fixation	*Number*	*%*
Tibial and femoral cementless	1964	8.9
Tibial and femoral cemented	19873	90.3
Tibial only cemented	104	0.5
Femoral only cemented	67	0.3
Total	**22008**	**100.0**

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

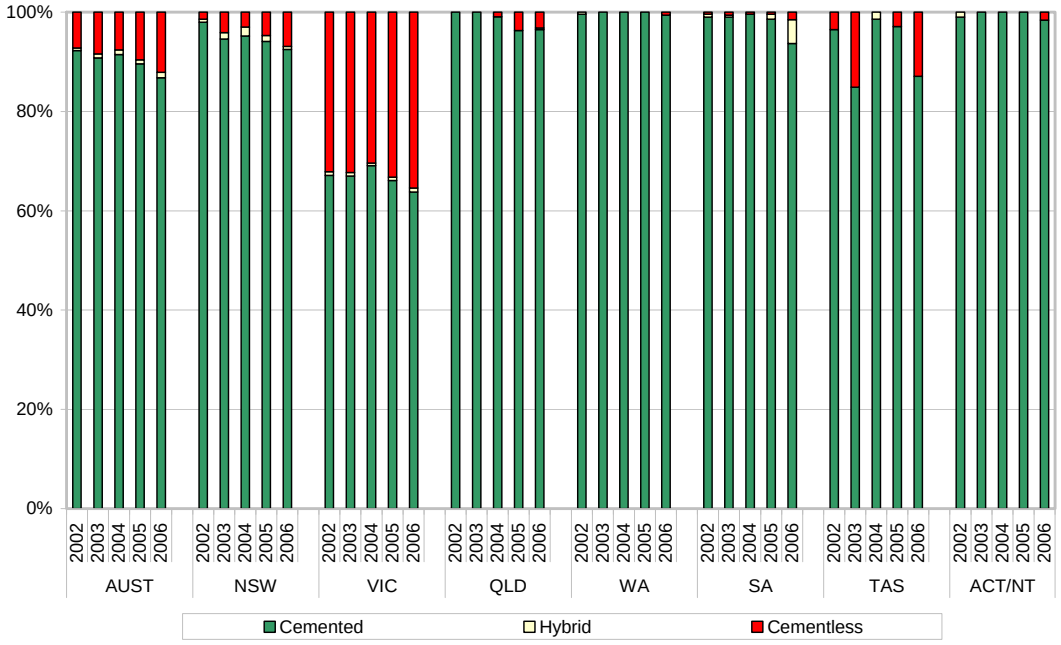
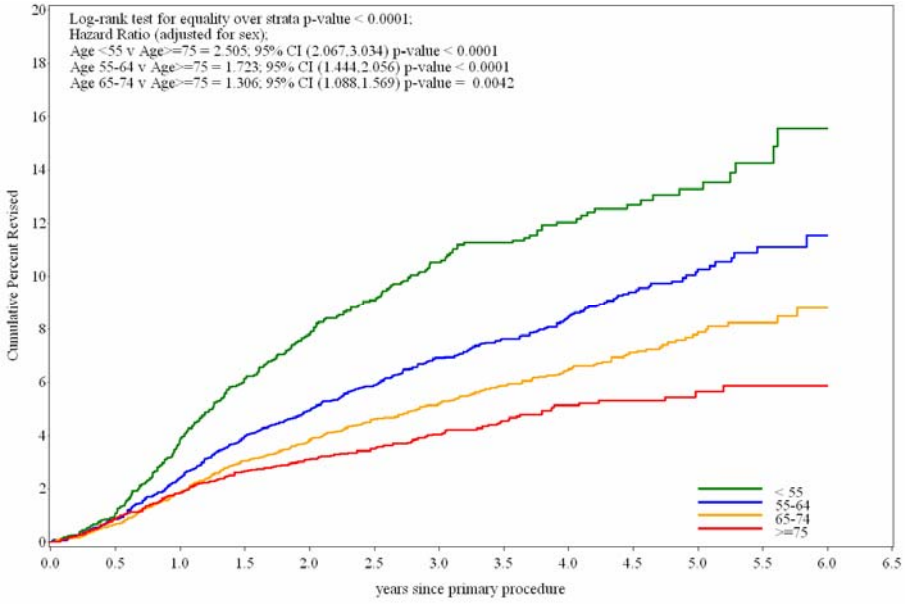


Table KU5: Primary Unicompartmental Knee Procedures Requiring Revision by Age (primary diagnosis OA)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<55	267	3013	8.9	8039	3.3	(2.93, 3.74)
55-64	435	7055	6.2	19138	2.3	(2.06, 2.50)
65-74	345	7029	4.9	20230	1.7	(1.53, 1.90)
75+	172	4645	3.7	13062	1.3	(1.13, 1.53)
Total	**1219**	**21742**	**5.6**	**60468**	**2.0**	**(1.90, 2.13)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<55	3013	2731	2374	2046	1773	1527	1264	1030	782	527	343	159	73
55-64	7055	6422	5689	4985	4277	3658	3049	2393	1803	1245	753	367	147
65-74	7029	6434	5783	5143	4529	3933	3376	2737	2065	1454	893	465	177
>=75	4645	4235	3843	3423	2979	2564	2109	1696	1251	860	495	242	110

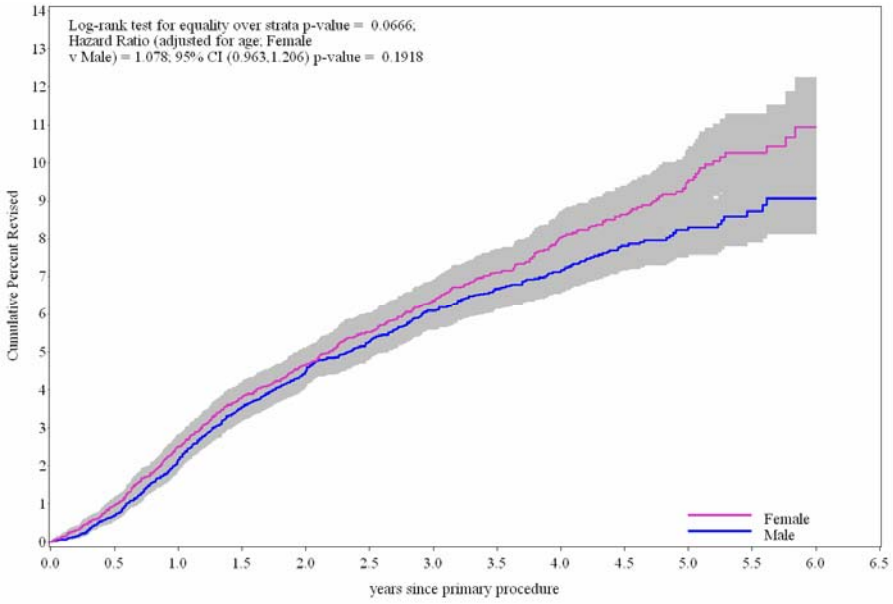
Table KU6: Yearly cumulative percentage revision of Unicompartmental Procedures by Age

Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
<55	3.9 (3.2, 4.7)	7.8 (6.8, 8.9)	10.5 (9.3, 11.9)	12.0 (10.7, 13.6)	13.3 (11.7, 15.1)
55-64	2.4 (2.1, 2.8)	4.9 (4.4, 5.5)	6.9 (6.2, 7.7)	8.4 (7.6, 9.3)	10.3 (9.2, 11.5)
65-74	1.9 (1.6, 2.2)	3.8 (3.4, 4.4)	5.2 (4.6, 5.8)	6.5 (5.8, 7.2)	7.9 (7.0, 8.9)
75+	1.9 (1.5, 2.3)	3.1 (2.6, 3.7)	4.0 (3.4, 4.8)	5.1 (4.4, 6.0)	5.6 (4.8, 6.7)

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	624	10610	5.9	29353	2.1	(1.96, 2.30)
Male	595	11132	5.3	31115	1.9	(1.76, 2.07)
Total	**1219**	**21742**	**5.6**	**60468**	**2.0**	**(1.90, 2.13)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Female	10610	9669	8594	7591	6561	5694	4727	3797	2838	1977	1194	596	246
Male	11132	10153	9095	8006	6997	5988	5071	4059	3063	2109	1290	637	261

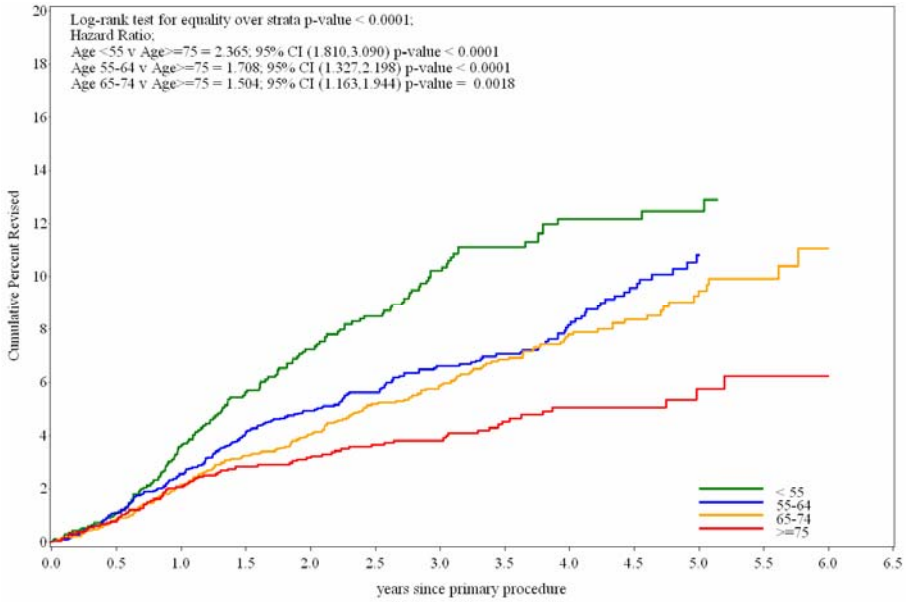
Table KU8: Yearly cumulative percentage revision of Unicompartmental Procedures by Sex (primary diagnosis OA)

Sex	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Female	2.5 (2.2, 2.8)	4.6 (4.2, 5.1)	6.4 (5.8, 6.9)	8.0 (7.4, 8.7)	9.5 (8.7, 10.4)
Male	2.1 (1.9, 2.5)	4.5 (4.1, 4.9)	6.1 (5.6, 6.6)	7.1 (6.5, 7.7)	8.3 (7.6, 9.1)

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

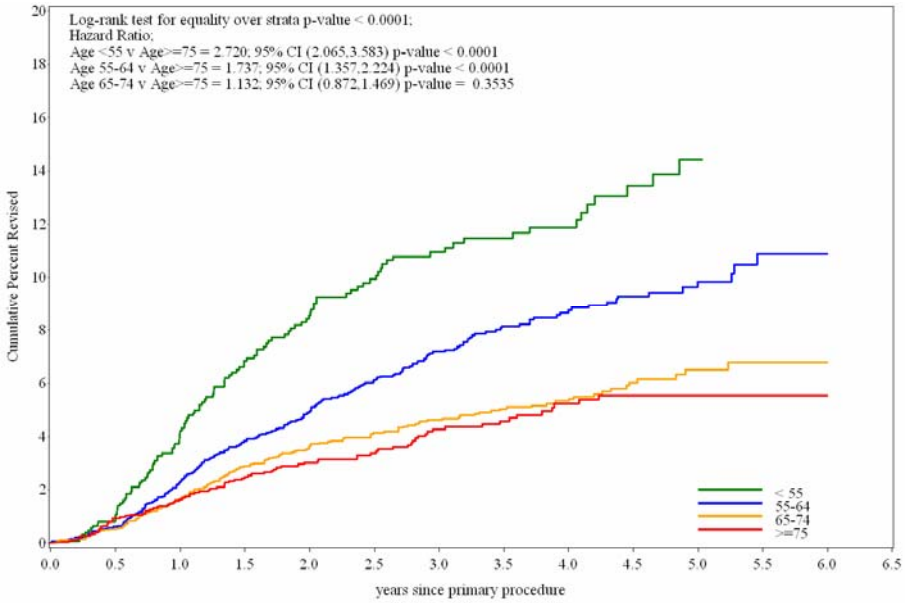
Sex and Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Females by Age						
Female <55	146	1723	8.5	4613	3.2	(2.67, 3.72)
Female 55-64	208	3413	6.1	9086	2.3	(1.99, 2.62)
Female 65-74	185	3222	5.7	9274	2.0	(1.72, 2.30)
Female >= 75	85	2252	3.8	6380	1.3	(1.06, 1.65)
Males by Age						
Male <55	121	1290	9.4	3425	3.5	(2.93, 4.22)
Male 55-64	227	3642	6.2	10052	2.3	(1.97, 2.57)
Male 65-74	160	3807	4.2	10956	1.5	(1.24, 1.70)
Male >= 75	87	2393	3.6	6682	1.3	(1.04, 1.61)
Total	**1219**	**21742**	**5.6**	**60468**	**2.0**	**(1.90, 2.13)**

Figure KU5: Cumulative percentage revision of Unicompartmental Procedures by Females



Females by Age	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<55	1723	1568	1365	1179	1014	884	717	581	447	306	210	96	47
55-64	3413	3101	2729	2385	2024	1738	1417	1126	831	570	324	163	58
65-74	3222	2941	2634	2355	2065	1802	1547	1259	955	680	417	222	84
>=75	2252	2059	1866	1672	1458	1270	1046	831	605	421	243	115	57

Figure KU6: Cumulative percentage revision of Unicompartmental Procedures by Males



Males by Age	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<55	1290	1163	1009	867	759	643	547	449	335	221	133	63	26
55-64	3642	3321	2960	2600	2253	1920	1632	1267	972	675	429	204	89
65-74	3807	3493	3149	2788	2464	2131	1829	1478	1110	774	476	243	93
>=75	2393	2176	1977	1751	1521	1294	1063	865	646	439	252	127	53

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*	*5 years*
Females by Age					
Female <55	3.6 (2.8, 4.6)	7.2 (6.0, 8.8)	10.2 (8.6, 12.1)	12.2 (10.3, 14.3)	12.5 (10.6, 14.7)
Female 55-64	2.6 (2.1, 3.2)	4.9 (4.2, 5.8)	6.6 (5.7, 7.7)	8.2 (7.0, 9.5)	10.8 (9.2, 12.7)
Female 65-74	2.2 (1.7, 2.8)	4.0 (3.4, 4.9)	5.9 (5.0, 6.9)	7.8 (6.7, 9.1)	9.5 (8.0, 11.1)
Female >= 75	2.1 (1.5, 2.8)	3.2 (2.5, 4.0)	3.8 (3.0, 4.8)	5.1 (4.0, 6.3)	5.7 (4.4, 7.4)
Males by Age					
Male <55	4.2 (3.2, 5.6)	8.5 (7.0, 10.4)	11.0 (9.1, 13.1)	11.9 (9.9, 14.2)	14.4 (11.8, 17.5)
Male 55-64	2.3 (1.8, 2.9)	4.9 (4.2, 5.8)	7.2 (6.2, 8.3)	8.7 (7.6, 9.9)	9.9 (8.5, 11.4)
Male 65-74	1.7 (1.3, 2.1)	3.6 (3.0, 4.4)	4.6 (3.9, 5.5)	5.3 (4.5, 6.3)	6.5 (5.5, 7.8)
Male >= 75	1.6 (1.2, 2.3)	3.0 (2.4, 3.9)	4.3 (3.4, 5.4)	5.2 (4.2, 6.5)	5.6 (4.4, 6.9)

Table KU11: Unicompartmental Primary Knee Procedures requiring Revision

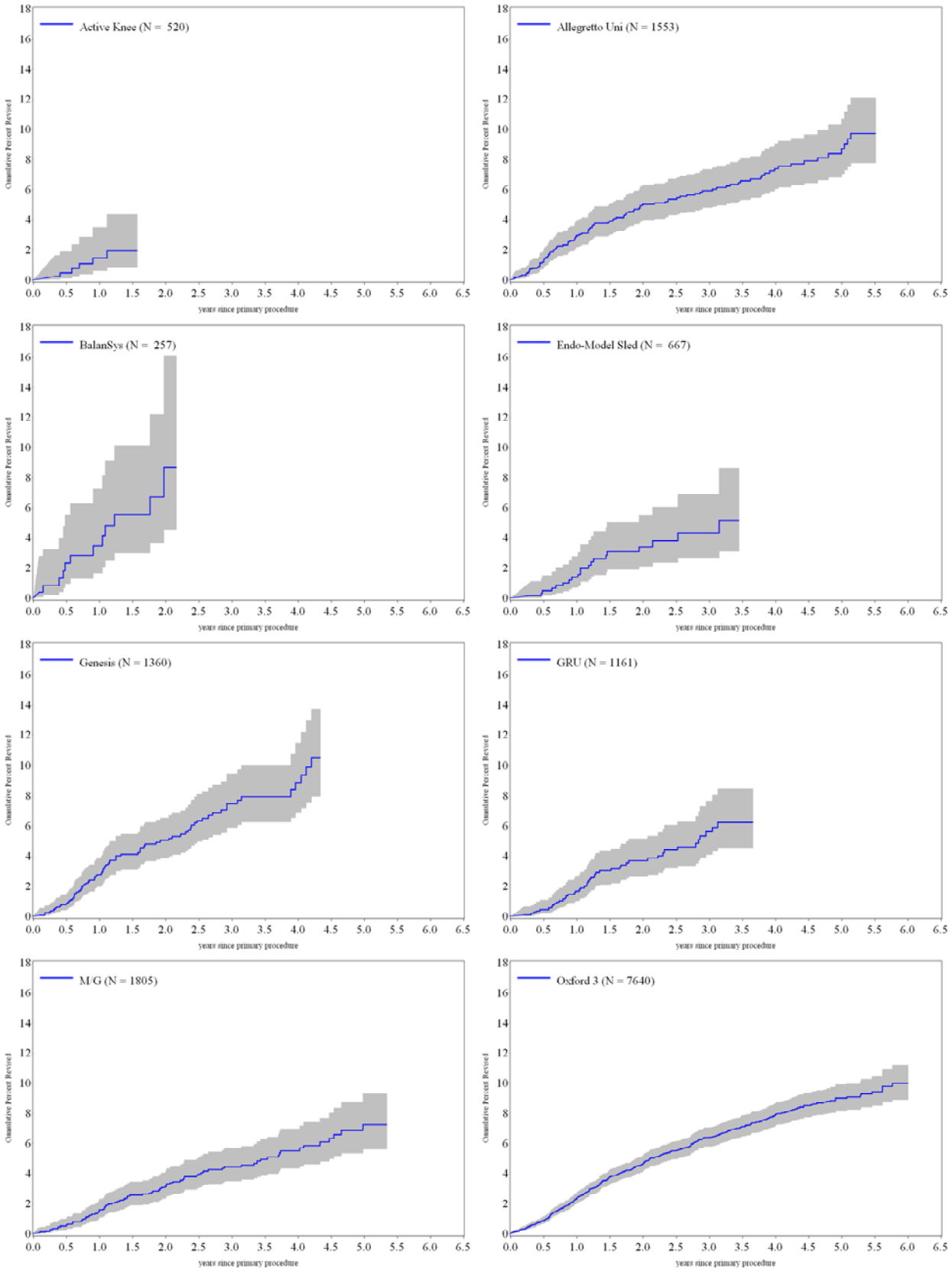
Model	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
AMC	30	350	8.6	624	4.8	(3.24, 6.86)
Active Knee	6	520	1.2	474	1.3	(0.46, 2.76)
Advance	7	32	21.9	71	9.8	(3.95, 20.23)
Allegretto Uni	102	1553	6.6	5252	1.9	(1.58, 2.36)
BalanSys	12	257	4.7	308	3.9	(2.01, 6.81)
Eius	6	116	5.2	236	2.5	(0.93, 5.54)
Endo-Model Sled	23	667	3.4	1278	1.8	(1.14, 2.70)
GRU	45	1161	3.9	2475	1.8	(1.33, 2.43)
Genesis	79	1360	5.8	3125	2.5	(2.00, 3.15)
HLS Uni Evolution	1	33	3.0	49	2.0	(0.05, 11.38)
LCS	5	26	19.2	138	3.6	(1.17, 8.43)
M/G	80	1805	4.4	5490	1.5	(1.16, 1.81)
Natural Knee	17	143	11.9	537	3.2	(1.85, 5.07)
Oxford 3	474	7640	6.2	23329	2.0	(1.85, 2.22)
PFC Sigma	12	137	8.8	721	1.7	(0.86, 2.91)
Preservation-Fixed	104	1691	6.2	4312	2.4	(1.97, 2.92)
Preservation-Mobile	59	387	15.2	1215	4.9	(3.70, 6.27)
Repicci	98	2175	4.5	7137	1.4	(1.11, 1.67)
UC-Plus	3	46	6.5	198	1.5	(0.31, 4.42)
Unix	74	1554	4.8	4131	1.8	(1.41, 2.25)
ZUK	0	355	0.0	214	0.0	(0.00, 1.72)
Total	**1237**	**22008**	**5.6**	**61313**	**2.0**	**(1.91, 2.13)**

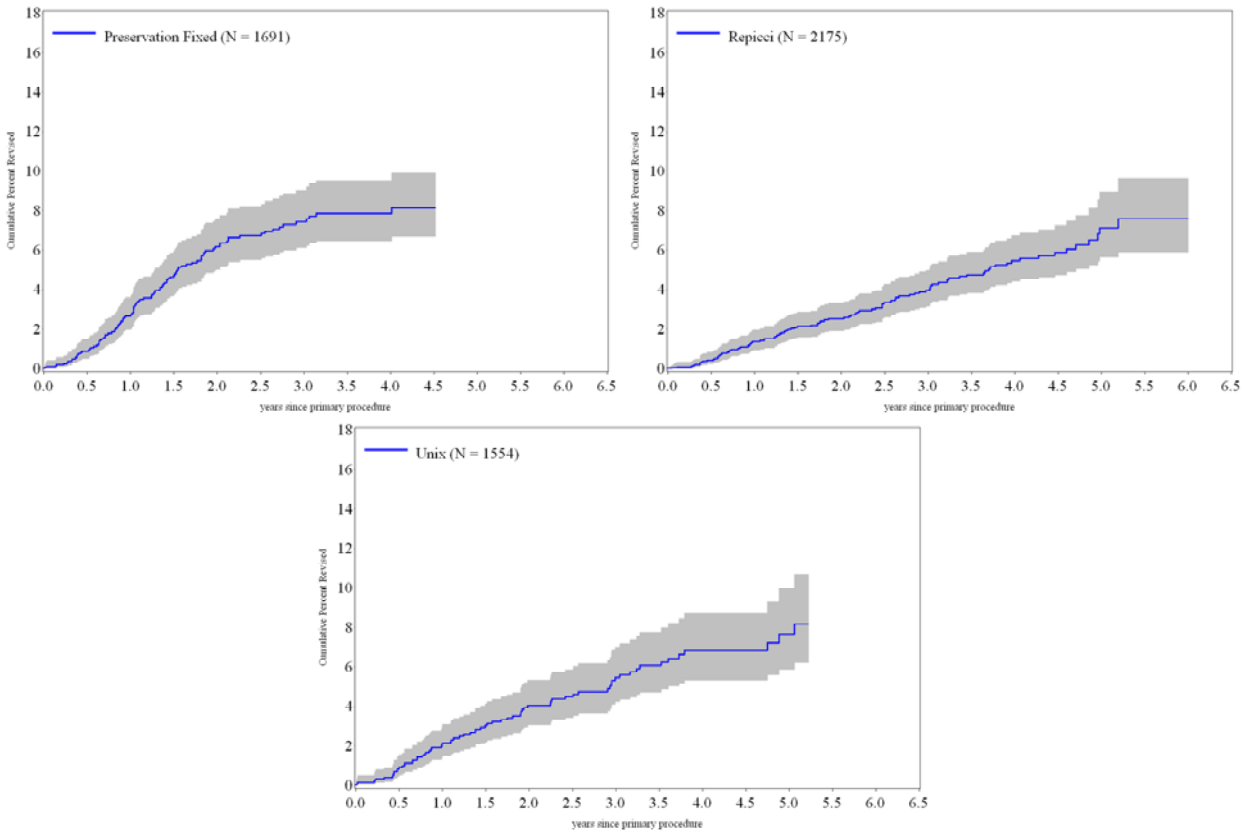
Table KU12: Comparison of Unicompartmental Primary Knee Procedures with Oxford 3

Model	*Hazard Ratio*	*95% CI for Hazard Ratio*	*Pr > Chi-Square*
AMC	1.982	(1.37, 2.88)	0.0003
Active Knee	0.539	(0.24, 1.21)	0.1344
Advance	4.801	(2.27, 10.14)	<.0001
Allegretto Uni	0.958	(0.77, 1.19)	0.6961
BalanSys	1.663	(0.93, 2.96)	0.0839
Eius	0.851	(0.38, 1.91)	0.6971
Endo-Model Sled	0.862	(0.57, 1.31)	0.4880
GRU	0.827	(0.61, 1.12)	0.2257
Genesis	1.182	(0.93, 1.50)	0.1704
HLS Uni Evolution	0.846	(0.12, 6.02)	0.8670
LCS	2.037	(0.83, 4.99)	0.1191
M/G	0.710	(0.56, 0.90)	0.0046
Natural Knee	1.581	(0.97, 2.57)	0.0641
PFC Sigma	0.739	(0.42, 1.32)	0.3057
Preservation Fixed	1.099	(0.89, 1.36)	0.3831
Preservation Mobile	1.951	(1.48, 2.57)	<.0001
Repicci	0.697	(0.56, 0.87)	0.0012
UC-Plus	0.820	(0.26, 2.55)	0.7317
Unix	0.786	(0.61, 1.01)	0.0560
Oxford 3	1.000		

***Note**: all unicompartmental prostheses have been compared to the Oxford 3*

Figures KU 7-17: Cumulative percentage revision of Unicompartmental Knee Prostheses (for >250 procedures)





Note: *Preservation Mobile has >250 procedures but is excluded. Refer to Figure 20*

Model	***Number at risk at start of the period***												
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3***	***3.5***	***4***	***4.5***	***5***	***5.5***	***6***
Active Knee	520	374	238	75	16								
Allegretto Uni	1553	1474	1365	1266	1160	1054	953	809	625	466	288	155	80
BalanSys	257	188	150	102	45	7							
Endo-Model Sled	667	599	513	403	300	191	130	62	31	10	1		
Genesis	1360	1219	1040	897	729	587	436	271	185	115	57	32	15
GRU	1161	1057	924	776	623	477	338	167	37				
M/G	1805	1720	1587	1436	1255	1067	886	720	546	378	246	143	61
Oxford 3	7640	7067	6410	5792	5176	4595	3948	3329	2594	1882	1180	623	281
Preservation Fixed	1691	1552	1397	1211	1025	853	669	500	331	172	76	11	
Repicci	2175	2080	1967	1855	1676	1484	1267	1061	840	580	308	98	12
Unix	1554	1379	1181	1038	905	785	660	539	411	299	197	101	24

Table KU13: Yearly cumulative percentage revision of Unicompartmental Procedures by Model

Model	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
AMC	5.6 (3.5, 8.9)	9.1 (6.2, 13.3)	13.4 (9.2, 19.4)		
Active Knee	1.5 (0.6, 3.5)				
Advance	12.8 (5.0, 30.6)	16.2 (7.1, 34.6)	25.3 (12.7, 46.4)		
Allegretto Uni	3.0 (2.2, 4.0)	5.0 (4.0, 6.3)	5.9 (4.8, 7.3)	7.4 (6.0, 9.0)	8.7 (7.1, 10.7)
BalanSys	3.5 (1.7, 7.2)	8.6 (4.6, 16.1)			
Eius	3.9 (1.5, 10.0)	6.2 (2.8, 13.4)	6.2 (2.8, 13.4)		
Endo-Model Sled	1.4 (0.7, 2.8)	3.4 (2.1, 5.5)	4.3 (2.7, 6.9)		
GRU	1.7 (1.0, 2.7)	3.7 (2.6, 5.1)	5.6 (4.1, 7.7)		
Genesis	2.8 (2.0, 3.9)	5.0 (3.9, 6.5)	7.5 (5.9, 9.5)	8.9 (6.9, 11.5)	
HLS Uni Evolution	3.3 (0.5, 21.4)	3.3 (0.5, 21.4)	3.3 (0.5, 21.4)	3.3 (0.5, 21.4)	
LCS	12.0 (4.0, 32.7)	12.0 (4.0, 32.7)	12.0 (4.0, 32.7)	12.0 (4.0, 32.7)	16.2 (6.4, 37.6)
M/G	1.6 (1.1, 2.3)	3.1 (2.4, 4.1)	4.5 (3.5, 5.7)	5.5 (4.4, 7.0)	7.2 (5.6, 9.3)
Natural Knee	5.6 (2.8, 10.9)	10.6 (6.5, 16.9)	12.1 (7.7, 18.7)	12.1 (7.7, 18.7)	12.1 (7.7, 18.7)
Oxford 3	2.4 (2.0, 2.7)	4.7 (4.2, 5.2)	6.4 (5.8, 7.0)	7.9 (7.2, 8.6)	9.0 (8.2, 9.9)
PFC Sigma	2.2 (0.7, 6.6)	5.8 (3.0, 11.3)	6.6 (3.5, 12.2)	6.6 (3.5, 12.2)	8.2 (4.6, 14.2)
Preservation Fixed	2.7 (2.0, 3.6)	6.2 (5.0, 7.6)	7.4 (6.1, 9.0)	7.9 (6.5, 9.5)	
Preservation Mobile	5.1 (3.3, 7.8)	9.8 (7.2, 13.4)	15.4 (12.0, 19.7)	17.4 (13.6, 22.1)	
Repicci	1.4 (0.9, 2.0)	2.5 (1.9, 3.3)	4.0 (3.1, 5.0)	5.5 (4.4, 6.7)	7.1 (5.6, 9.0)
UC-Plus	0	0	2.3 (0.3, 15.4)	2.3 (0.3, 15.4)	7.7 (2.5, 22.3)
Unix	2.1 (1.5, 3.1)	4.0 (3.1, 5.3)	5.5 (4.2, 7.0)	6.8 (5.3, 8.7)	7.7 (5.9, 10.0)
ZUK	0				

***Note**: Cumulative Percent Revised equal to 0 indicates that the prosthesis combination has been followed up to this time with no revisions recorded*

Primary Unicompartmental Knee Replacement Prostheses

with a higher than anticipated revision rate

Table KU14: Individual Primary Unicompartmental Knee Prostheses with higher than anticipated revision rates

Model	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Hazard Ratio*	*P Value*	*Exact 95%CI*
Advance	32	21.9	71	9.8	4.95	<0.001	(2.4, 10.4)
AMC	350	8.6	624	4.8	2.12	<0.001	(1.5, 3.0)
Preservation Mobile	386	15.3	1210	4.9	2.14	<0.001	(1.6, 2.8)

Note: *All components have been compared to all other Unicompartmental components*

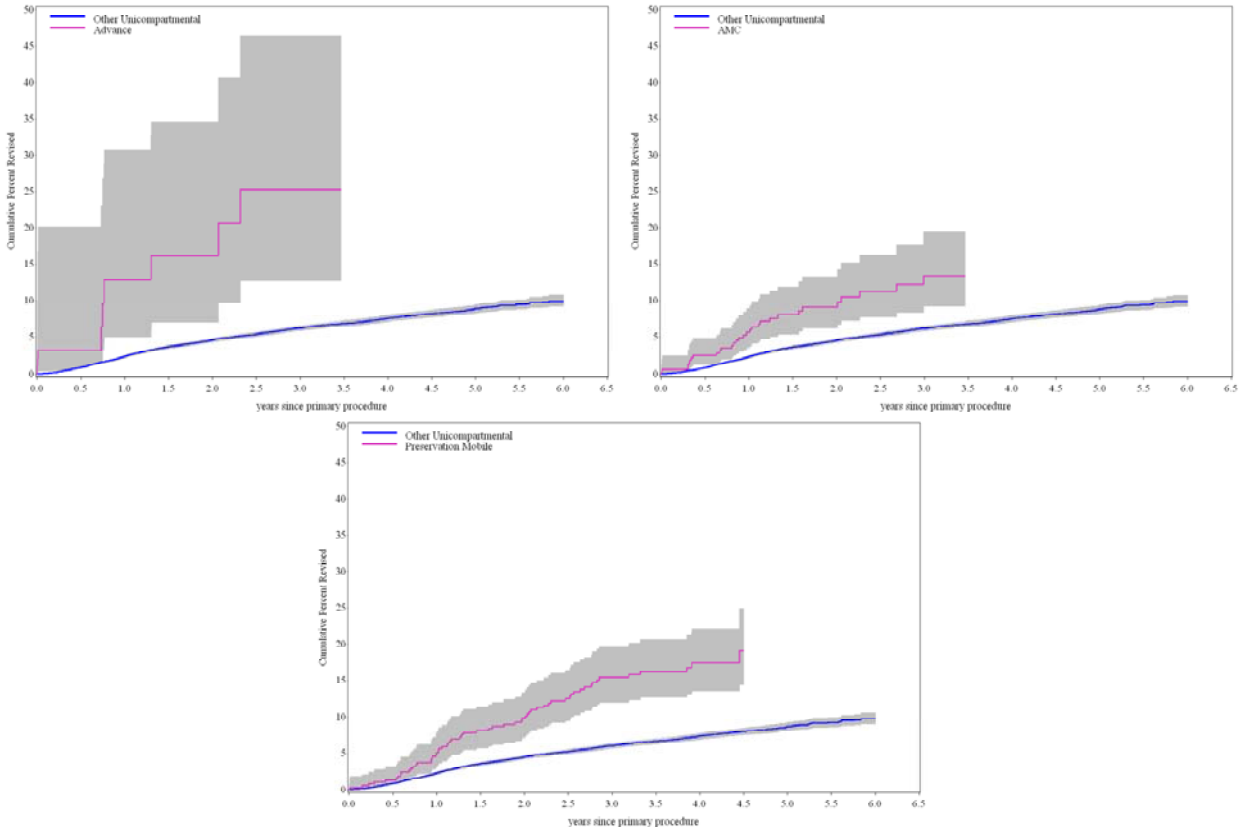
Table KU15: Yearly cumulative percentage revision of individual primary Unicompartmental knee Prostheses that have been identified as having a higher than anticipated revision rate

Model	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Advance	12.8 (5.01, 30.63)	16.2 (7.08, 34.60)	25.3 (12.68, 46.44)	
AMC	5.61 (3.52, 8.89)	9.11 (6.20, 13.28)	13.4 (9.18, 19.41)	
Preservation Mobile	5.09 (3.27, 7.86)	9.85 (7.20, 13.40)	15.5 (12.06, 19.75)	17.5 (13.67, 22.14)

Table KU16: Yearly Usage of individual primary Unicompartmental knee prostheses that have been identified as having a higher than anticipated revision rate

Model	*Year of Implant*							
	1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Advance					13	11	6	2
AMC					80	65	122	83
Preservation Mobile			15	149	121	59	26	16

Figures 18-20: Cumulative percentage revision of individual primary Unicompartmental knee prostheses that have been identified as having a higher than anticipated revision rate



Primary total knee replacement

This report is based on the analysis of 134,799 primary total knee replacement procedures recorded by the Registry with a procedure date prior to 31st December 2006. This is an additional 26,997 primary total knee replacement procedures compared to last year's report.

Analysis of knee systems V's individual prosthesis design

The Registry is able to present data on the different types of knee prostheses. Different knee prostheses however are generally available as part of a knee system. The systems may contain many alternative prostheses which may vary in design depending on numerous features including the method of fixation, stability, mobility, flexion capacity and the materials used amongst others.

Although possible, subdividing the various prostheses based on all the different design differences presents complexities and difficulties with providing a coherent presentation of the data.

The approach the Registry uses to address this issue is to provide information on all knee systems and then subdivide this on the basis of fixation. Additionally it then provides analysis related to different design features which individual prostheses from the different systems have in common. Finally analysis of the revision rates of individual prostheses looks at the catalogue ranges within a system in an attempt to highlight differences which are specific to a particular design within a particular system.

Usage

Primary total knee replacement is by far the most frequently used category of knee replacement. It continues to increase as a proportion of all knee replacement procedures. In 2003 it accounted for 77.3% of all knee replacements and this has increased to 81% in 2006. This trend is evident in all states with the exception of ACT/NT where the proportion of primary total knee replacement procedures has declined from 79% in 2005 to 73.6% in 2006 (Figure KG3).

The Genesis II total knee system was the most frequently used system in 2006, accounting for 14.7% of all primary total knee procedures. The LCS, which was previously the most used system since the Registry commenced data collection, has declined slightly and in 2006 accounted for 13.3% of all primary total knee procedures. (Table KT1 and Figure KT1).

The Triathlon and the RBK are two new systems in the top 10 group for 2006. In 2006 the five most frequently used systems accounted for 61.2% of all primary total knee procedures. The next five were used in 23.8% and the remaining 39 in 15% of all primary total knee procedures.

The number of different systems used in 2006 increased to 49 systems compared to 46 in 2005. The number of systems using cemented primary total knee prostheses however increased from 41 in 2005 to 46 in 2006 (Table KT3).

The ten most frequently used knee systems with respect to cement, cementless and hybrid fixation are provided in Tables KT2, KT3 and KT4 and Figures KT2, KT3 and KT4.

Changes in use with Gender and Age

Women undergo primary total knee replacement more frequently than men (58%). The proportion of women receiving primary total knee replacement has increased slightly over recent years (Table KT5).

During the last five years there has been little change in the age distribution of patients receiving primary total knee replacement apart from a small proportional increase in the 55-64 year age group and an associated small decline in the 65-74 year age group. Other age

groups have remained relatively constant (Table KT6).

Fixation

When considering all primary total knee replacements recorded by the Registry, cement fixation of one or more components has been used in 76.3% of all procedures. Cementing of both the femoral and tibial components is the most common method of fixation (49.4%). Hybrid fixation has been used in 26.9% of all procedures and cementless fixation in 23.7%. Hybrid fixation almost always involves cementing the tibial component only (Table KT7).

Over the last four years there has been an increase in the use of cement fixation of both components and a slight decrease in hybrid and cementless fixation (Figure KT5).

There is variation in the approach to fixation in the various states and territories, particularly when comparing the use of totally cemented and cementless prostheses (Figure KT5).

Use of Patella Resurfacing

The majority of primary total knee replacement procedures do not have a patella prosthesis used as part of the procedure. During 2006, 57.5% of all primary knees did not have a patella resurfacing. This proportion has remained relatively unchanged for the last five years.

There is however some variation in the use of patella resurfacing between states. In South Australia and Tasmania, patellar prostheses are used in less than 20% of primary total knees. In Victoria and NSW this figure approaches 50%. The remaining states and territories are between these two ranges. When a patellar resurfacing is undertaken, most prostheses are used with cement fixation (93.3%) (Table KT7). The proportion of patella prostheses fixed using cement has not changed in the last five years (Figure KT6)

Outcomes Primary Total Knee

Age and Gender

Age has a major impact on revision rates of primary total knee replacement. The Registry has compared four age groups; less than 55 years, 55-64 years, 65-74 years and 75 years or older. Those aged less than 55 years have the highest rate of revision. The revision rate for each age group progressively declines with increasing age. There is a statistically significant difference between each of the age groups (Table KT 8 and Figure KT7). The cumulative percent revised at five years for the less than 55 years age group is 8.0%, 55-64 years is 4.9%, 65-74 year is 3.4% and 75 years or older is 2.1% (Table KT9).

Men have a higher rate of revision than women. Although the difference is not large it is statistically significant (hazard ratio (adjusted for age) male v female = 1.191; 95%CI (1.108, 1.280) P<0.0001) (Table KT10 and Figure KT8). The cumulative percent revision rate at five years for males is 4.0% and for females is 3.3% (Table KT11).

Comparison of cumulative percent revision by age and sex, does not demonstrate a gender difference in those less than 55 years of age. Both males and females have a cumulative percent revision at five years of 8.0%. There are small gender differences in revision rates for the three older age groups with males having a higher revision rate in each group (Tables KT12 and 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 96,082 fixed and 38,236 mobile primary total knee replacements. There is a small but statistically significant higher risk of revision when mobile inserts are used

(hazard ratio (adjusted for age and sex) mobile v fixed = 1.173; 95%CI (1.086, 1.268) P=0.0001) (Figure KT11). The five year cumulative percent revision for primary total knee replacements with a mobile insert is 4.1% and for fixed inserts is 3.2% (Tables KT14, KT15 and 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.

For the first time the Registry has reported a small increased risk of revision of posterior stabilised knees compared to minimally stabilised (hazard ratio (adjusted for age and sex); posterior stabilised v minimal = 1.109; 95% CI (1.013, 1.215) P=0.0259). At five years the cumulative percent revision of minimally stabilised knees is 3.5% and posterior stabilised is 4.0% (Table KT17 and KT18 and Figure KT12).

There are small numbers of fully stabilized and hinged prostheses recorded in the Registry. The revision rates for these prostheses are higher than for both minimally and posterior stabilised knees. These prostheses however are not routinely used in primary knee replacement and are used in more complex procedures (Table KT17).

Patellar Prosthesis v No Patellar Prosthesis

In primary total knee replacement the revision rate is higher if a patellar prosthesis is not used (hazard ratio (adjusted for age and sex) no patella v patella = 1.341; 95% CI (1.245, 1.444) P<0.0001). At five years the cumulative percent revised is 4.0% when a patellar prosthesis is not used and 3.1% in procedures where it is used. (Tables KT19, KT20 and Figure KT13).

This difference is not affected by age as the revision rate when the patella is not used is significantly higher in each of the four age groups (under 55 years (hazard ratio 1.26: 95% CI (1.04, 1.53) P=0.021), 55-64 years (hazard ratio 1.35; 95% CI (1.17, 1.54) P<0.001), 65-74 years (hazard ratio 1.33; 95% CI (1.19, 1.51) P<0.001) and 75 years and older ((hazard ratio 1.40; 95% CI (1.19, 1.65) P<0.001).

The difference in revision rates when a patellar prosthesis is not used appears to be due to subsequent resurfacing of the patella or resurfacing and change of insert.

Fixation

There is no significant difference in the revision rate of cementless, cemented or hybrid procedures (Table KT21 and KT22 and Figure KT14).

In determining revision rates related to fixation the Registry has excluded cementless oxinium prostheses from the analysis. These prostheses were withdrawn a number of years ago because of their known high rates of revision. Their inclusion would falsely elevate the revision rate of all other cementless knee prostheses.

Prostheses Types

The Registry has detailed the revision rates for different prostheses. It has subdivided the prostheses into three groups according to the method of fixation used, cemented, cementless or hybrid. Only prostheses with more than 1,000 observed component years as of the 31st December 2006 are individually reported. Prostheses with less than 1,000 observed component years are grouped together and reported as 'Others'. Prostheses in this 'Others' group are used infrequently or are new to the market and as yet have insufficient numbers to be identified individually in the tables. As has been pointed out in previous reports, the combined revision rate of this group is generally higher than more frequently used prostheses.

The least revised prosthesis is the cemented Nexgen. This prosthesis has been used in over 5,000 procedures recorded by the Registry. It has a cumulative percent revision at five years of 1.8% (Table KT24). Similar numbers of

the Nexgen have also been used with cementless and hybrid fixation and there is no statistical difference in the rate of revision by fixation for the Nexgen prosthesis. The cumulative percent revised at five years for the cementless Nexgen is 2.1% and the hybrid Nexgen is 2.5%.

There are also a number of other different types of Nexgen. These include Nexgen LPS, Nexgen LPS Flex and the Nexgen MBK. Each has a higher rate of revision than the original Nexgen. The Nexgen LPS and the Nexgen LPS Flex both have statistically higher revision rates than the Nexgen ((hazard ratio = 1.41; 95% CI (1.1, 1.8) P=0.008) and (hazard ratio = 1.40; 95% CI (1.1, 1.8) P=0.016) respectively) (data not shown).

The only other prosthesis that has a cumulative percent revision less than 2% at five years is the cementless Advantim (1.9%) (Table KT26). However, just less than 500 procedures using this prosthesis have been reported to the Registry.

Comparison of Unicompartmental to Total Primary Knee Replacement

The revision rate for primary unicompartmental knees is significantly higher than primary total knees (hazard ratio (adjusted for age and sex) unicompartmental vs total = 2.008; 95%CI (1.88, 2.15) P<0.0001). Unicompartmental knee procedures have a five year cumulative percent revised of 8.9% compared to 3.6% for primary total knees (Tables KT29, KT30 and Figure KT15).

This difference in outcome is not age or gender specific. The revision rate at any age for either gender is almost double for unicompartmental knee replacement compared to primary total knee replacement (Table KT31 and KT32 and Figures KT16 –KT23)

Prostheses with higher than anticipated revision rate

In the 2006 Report, the Registry identified six prostheses as having higher than anticipated revision rates. In addition to these six the analysis undertaken for this report has identified a further three primary total knee prostheses with a higher than anticipated revision rate.

The prostheses reported in the last annual report included four prostheses using the now withdrawn cementless oxinium (macro-textured) femoral component. These were the cementless oxinium Genesis II with both fixed and mobile bearing tibial components and the cementless oxinium Profix also with fixed and mobile bearing tibial components. In addition the Trac knee was also listed, which was last used in Australia in 2004. The sixth knee reported last year was the Profix combined with the mobile bearing tibial component. This is not an oxinium total knee but utilises a CoCr femoral component. These prostheses were used in 2006. All of the prostheses identified in the last annual report as having a higher than anticipated rate of revision have again been identified in the analysis for this year's report.

In addition this report has also identified the Gemini MKII, Interax and the Optetrak, in particular the posterior stabilised Optetrak (Optetrak-PS), as having a higher than anticipated rate of revision. Of these, the Optetrak PS is the only one that was used in 2006.

The number of revisions and revision rates of these nine prostheses are provided. (Tables KT33, KT34 and KT35 and Figures KT24-KT30). Discussion is limited, however, to the two prostheses that were still in use in 2006, the Profix/Mobile Bearing Knee and the Optetrak PS.

The Profix femoral prosthesis when combined with the Profix Mobile Bearing Tibial prosthesis has a significantly higher revision rate compared to all other primary knee replacements combined (hazard ratio = 2.27 95% CI (1.8, 2.9) P<0.001). The Registry has recorded information on 1,139 procedures with 3,074 observed component years. Just less than 6% of all procedures have been revised and there are 2.2 revisions per 100 observed component years. The cumulative percent revision at

four years is 7.45%.

There are a number of different prostheses within this group of Profix femoral combined with mobile bearing tibial prostheses.

There are two types of tibial prostheses, the cemented and cementless Profix Mobile Bearing Tibial prostheses. There is no difference in the revision rate for these two tibial prostheses (2.2 revisions per 100 observed component years for both) (data not shown).

There are three different femoral prostheses, the Profix CR, Profix Non Porous and the Profix Porous. The Profix CR (porous with HA) is a more recent prosthesis first recorded by the Registry in 2003. The Registry first recorded data on the other two Profix femoral prostheses, used in combination with the Mobile Bearing Tibial prostheses in 2001. In 2006 there has been a considerable decline in use of all three femoral prostheses when used in combination with the Mobile Bearing Tibial prostheses. The cumulative percent revision for this combination for the three femoral prostheses are Profix CR (6.3% at two years) Profix Non Porous (6.6% at four years) and the Profix Porous (7.1 % at four years) (data not shown).

Analysis of the revision rates of the Optetrak knee system is complicated by the large variety of different combinations of femoral and tibial components used in this system. The Registry has information on 19 different 'Optetrak' femoral and tibial prostheses combinations used in primary total knee replacement some of which have only been used in small numbers. There are varying combinations of posterior stabilised (PS) and cruciate retaining (CR) femoral components (Exactech cemented and porous (PS and CR), Asymmetric cemented and porous (PS and CR), and Hi Flex cemented and porous (PS). There is also a variety of tibial components (Exactech, Trapezoid, All Poly, RBK and Offset revision) that have been used in primary knee replacements. All of the tibial components have been cemented.

Analysis is further complicated as some of the combinations have only been used for a short period, in particular the High Flex Optetrak-PS femoral prosthesis.

Although there are some differences related to the type of tibial component the major difference is related to the type of femoral component. The most frequently used femoral prosthesis is the posterior stabilised femoral prosthesis (Optetrak-PS). It is this prosthesis that has been identified as having a higher than anticipated rate of revision (hazard ratio = 2.13; 95% CI (1.5, 3.0) $P<0.001$). The Registry has recorded over 900 procedures using the Optetrak-PS, 4% have been revised with 2 revisions per 100 observed component years. The cumulative percent revision at four years is 6.64%.

The Registry has recorded 163 procedures using the High Flex Optetrak-PS prosthesis but with only 63 observed component years. To date there has been one revision reported for the High Flex Optetrak-PS.

The Optetrak cruciate retaining femoral component (Optetrak-CR) has a lower rate of revision than the Optetrak-PS. The Registry has recorded 7 revisions from 277 procedures using this prosthesis with 841 observed component years. This equates to 0.83 revisions per 100 observed components years. The revision rate of the Optetrak-CR is comparable to other knee prostheses.

Primary Total Knee Replacement - 1/9/1999 to 31/12/2006

Prosthesis Usage

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

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	LCS (3139)	LCS (3180)	LCS (3517)	LCS (3691)	Genesis II (3942)
2	Duracon (3011)	Duracon (2840)	Genesis II (3005)	Genesis II (3633)	LCS (3562)
3	Nexgen (2017)	Genesis II (2244)	Duracon (2649)	Nexgen (3057)	PFC Sigma (3334)
4	Genesis II (1835)	Nexgen (2158)	Nexgen (2501)	PFC Sigma (2914)	Nexgen (3083)
5	PFC Sigma (1786)	Scorpio (2109)	PFC Sigma (2481)	Duracon (2654)	Scorpio (2510)
6	Scorpio (1753)	PFC Sigma (1941)	Scorpio (2133)	Scorpio (2457)	Duracon (2269)
7	Profix (944)	Profix (1193)	Nexgen LPS Flex (1259)	Nexgen LPS Flex (1684)	Nexgen LPS Flex (1723)
8	Nexgen LPS (857)	Natural Knee (1001)	Profix (1203)	Profix (1247)	Triathlon (971)
9	Natural Knee (811)	Nexgen LPS (901)	Active Knee (827)	Active Knee (763)	Profix (867)
10	AGC (633)	Nexgen LPS Flex (686)	Nexgen LPS (749)	Natural Knee (561)	RBK (576)
% using 10 Most Common	86.4%	84.1%	87%	86.8%	85%
Total N Procedures	19432	21697	23374	26107	26854
Total N Prosthesis Types	49	46	48	46	49

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

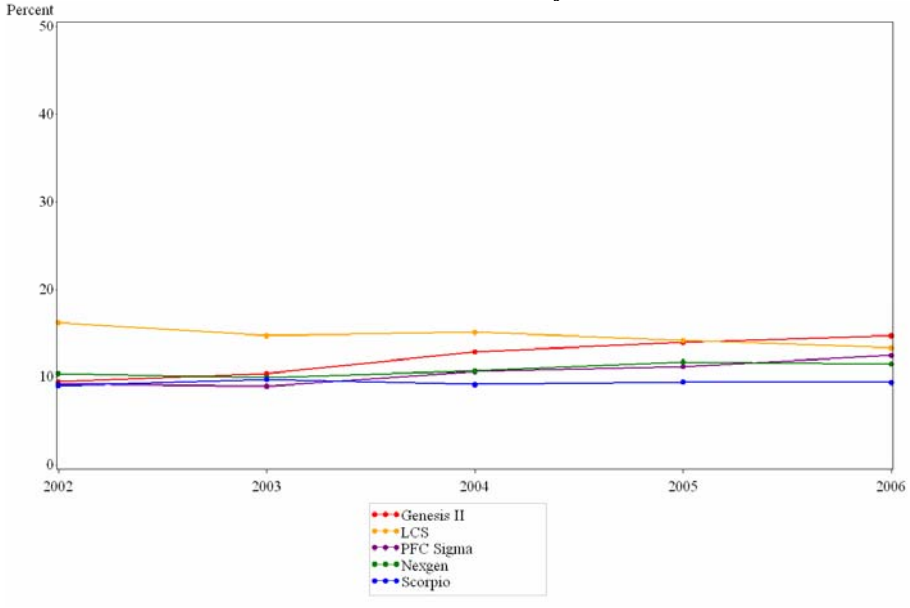


Table KT2: 10 Most Common Prostheses used with Cement Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Genesis II (1341)	Genesis II (1635)	Genesis II (2413)	Genesis II (3014)	Genesis II (3289)
2	LCS (1183)	Duracon (1242)	PFC Sigma (1401)	Nexgen LPS Flex (1656)	PFC Sigma (2009)
3	Duracon (1172)	LCS (983)	Nexgen LPS Flex (1251)	PFC Sigma (1581)	Nexgen LPS Flex (1646)
4	PFC Sigma (868)	PFC Sigma (841)	Duracon (1210)	Duracon (1189)	Duracon (1153)
5	Nexgen LPS (767)	Nexgen LPS (828)	LCS (999)	Nexgen (954)	Nexgen (1071)
6	Nexgen (703)	Nexgen (802)	Nexgen (944)	LCS (933)	Scorpio (836)
7	Scorpio (619)	Scorpio (710)	Profix (713)	Scorpio (791)	LCS (789)
8	Profix (516)	Nexgen LPS Flex (683)	Scorpio (711)	Profix (765)	Triathlon (697)
9	AGC (406)	Profix (640)	Nexgen LPS (662)	Nexgen LPS (428)	Profix (560)
10	Kinemax Plus (397)	AGC (394)	AGC (369)	AGC (367)	AGC (328)
% using 10 Most Common	87.6%	87.7%	92.1%	89.7%	88.1%
Total N Procedures	9101	9992	11594	13021	14056
Total N Prosthesis Types	41	40	38	41	46

Figure KT2: 5 Most Common Prostheses used with Cement Fixation

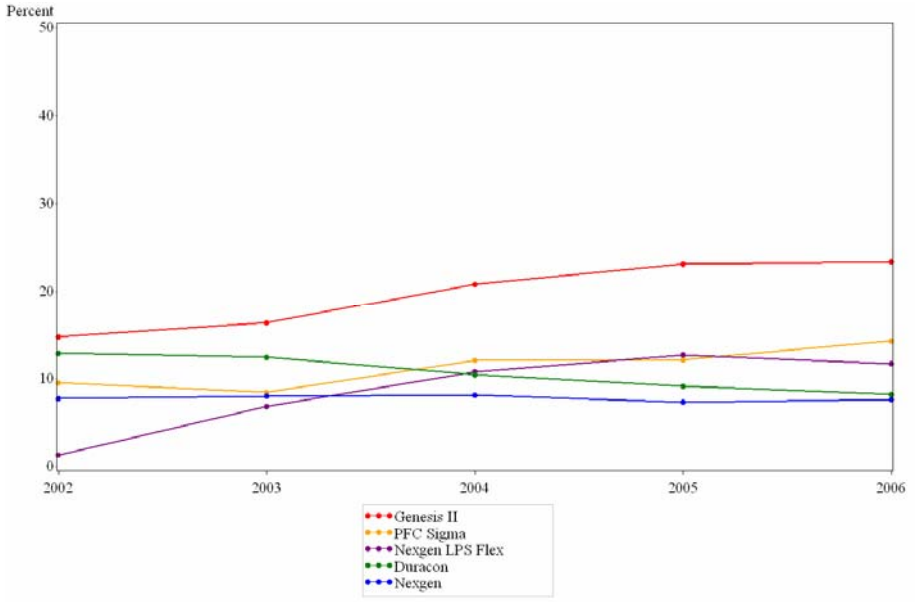


Table KT3: 10 Most Common Prostheses used with Cementless Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	LCS (1299)	LCS (1468)	LCS (1753)	LCS (1943)	LCS (2059)
2	Nexgen (754)	Nexgen (784)	Nexgen (792)	Nexgen (1107)	Nexgen (947)
3	Duracon (524)	Scorpio (499)	Active Knee (687)	Scorpio (600)	Scorpio (595)
4	Natural Knee (373)	Natural Knee (491)	Scorpio (543)	Active Knee (473)	PFC Sigma (426)
5	Scorpio (319)	Active Knee (480)	Duracon (373)	Duracon (441)	Duracon (413)
6	RBK (229)	Duracon (477)	Natural Knee (371)	PFC Sigma (386)	RBK (362)
7	PFC Sigma (225)	PFC Sigma (313)	PFC Sigma (321)	RBK (382)	Active Knee (264)
8	Active Knee (194)	Profix (300)	RBK (275)	Natural Knee (255)	Natural Knee II (225)
9	Profix (190)	RBK (300)	Profix (202)	Profix (213)	Triathlon (171)
10	Maxim (135)	Maxim (139)	Maxim (85)	Advantim (78)	Profix (161)
% using 10 Most Common	91.2%	92.4%	95.6%	94.6%	90.4%
Total N Procedures	4653	5680	5650	6213	6223
Total N Prosthesis Types	27	21	21	26	26

Figure KT3: 5 Most Common Prostheses used with Cementless Fixation

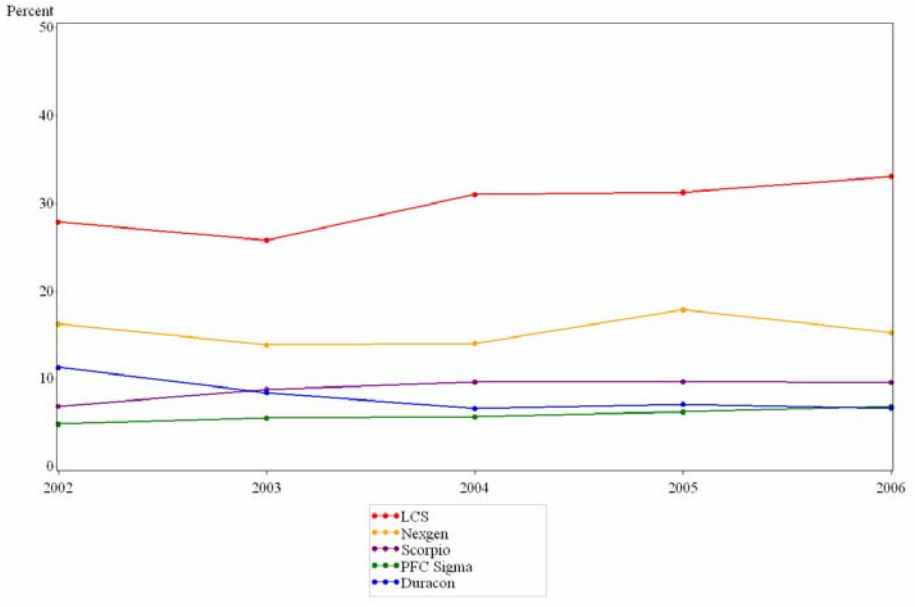


Table KT4: 10 Most Common Prostheses used with Hybrid Fixation

Rank	*2002*	*2003*	*2004*	*2005*	*2006*
1	Duracon (1315)	Duracon (1121)	Duracon (1066)	Scorpio (1066)	Scorpio (1079)
2	Scorpio (815)	Scorpio (900)	Scorpio (879)	Duracon (1024)	Nexgen (1065)
3	PFC Sigma (693)	PFC Sigma (787)	LCS (765)	Nexgen (996)	PFC Sigma (899)
4	LCS (657)	LCS (729)	Nexgen (765)	PFC Sigma (947)	LCS (714)
5	Nexgen (560)	Nexgen (572)	PFC Sigma (759)	LCS (815)	Duracon (703)
6	Genesis II (384)	Genesis II (482)	Genesis II (510)	Genesis II (565)	Genesis II (586)
7	Natural Knee (238)	Profix (253)	Profix (288)	Profix (269)	Active Knee (201)
8	Profix (238)	Maxim (251)	Maxim (284)	Maxim (214)	Maxim (181)
9	AGC (226)	Natural Knee (237)	Natural Knee (206)	Active Knee (210)	Profix (146)
10	Maxim (105)	AGC (191)	AGC (137)	Natural Knee (177)	Nexgen LPS (133)
% using 10 Most Common	92.1%	91.7%	92.3%	91.4%	86.8%
Total N Procedures	5678	6025	6130	6873	6575
Total N Prosthesis Types	29	34	36	32	33

Figure KT4: 5 Most Common Components used with Hybrid Fixation

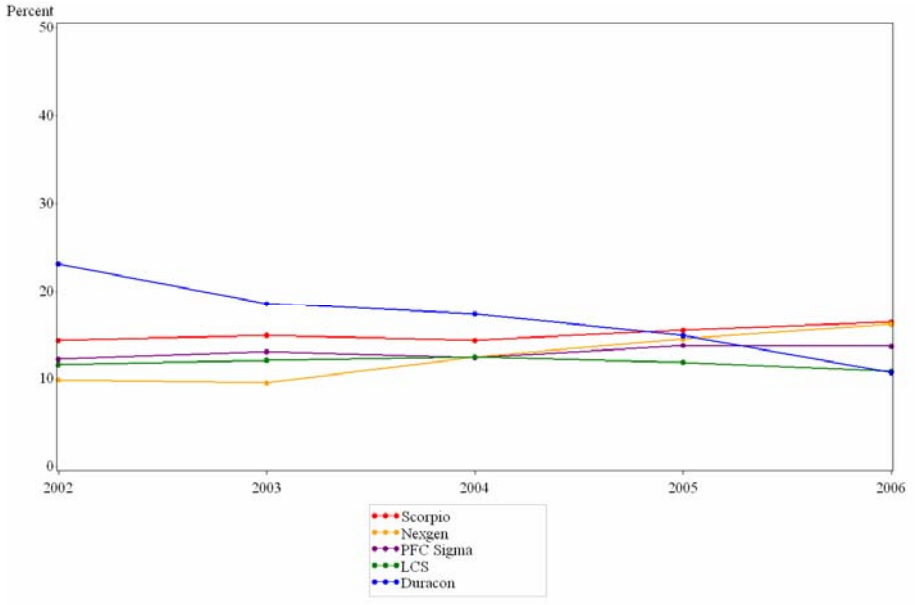


Table KT5: Usage of Primary Total Knee Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	11019	56.7	8413	43.3	19432	100.0
2003	12500	57.6	9197	42.4	21697	100.0
2004	13533	57.9	9841	42.1	23374	100.0
2005	15163	58.1	10944	41.9	26107	100.0
2006	15574	58.0	11280	42.0	26854	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*	*%*
2002	1292	6.6	4291	22.1	7456	38.4	5780	29.7	613	3.2	19432	100.0
2003	1529	7.0	4864	22.4	8228	37.9	6399	29.5	677	3.1	21697	100.0
2004	1579	6.8	5359	22.9	8859	37.9	6869	29.4	708	3.0	23374	100.0
2005	1713	6.6	6156	23.6	9614	36.8	7791	29.8	833	3.2	26107	100.0
2006	1753	6.5	6591	24.5	9974	37.1	7628	28.4	908	3.4	26854	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	31953	23.7	3320	10.4	6912	21.6
Tibial and femoral cemented	66628	49.4	62	0.1	33347	50.0
Tibial only cemented	34877	25.9	422	1.2	12561	36.0
Femoral only cemented	1341	1.0	38	2.8	697	52.0
Total	**134799**	**100.0**	**3842**	**2.9**	**53517**	**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

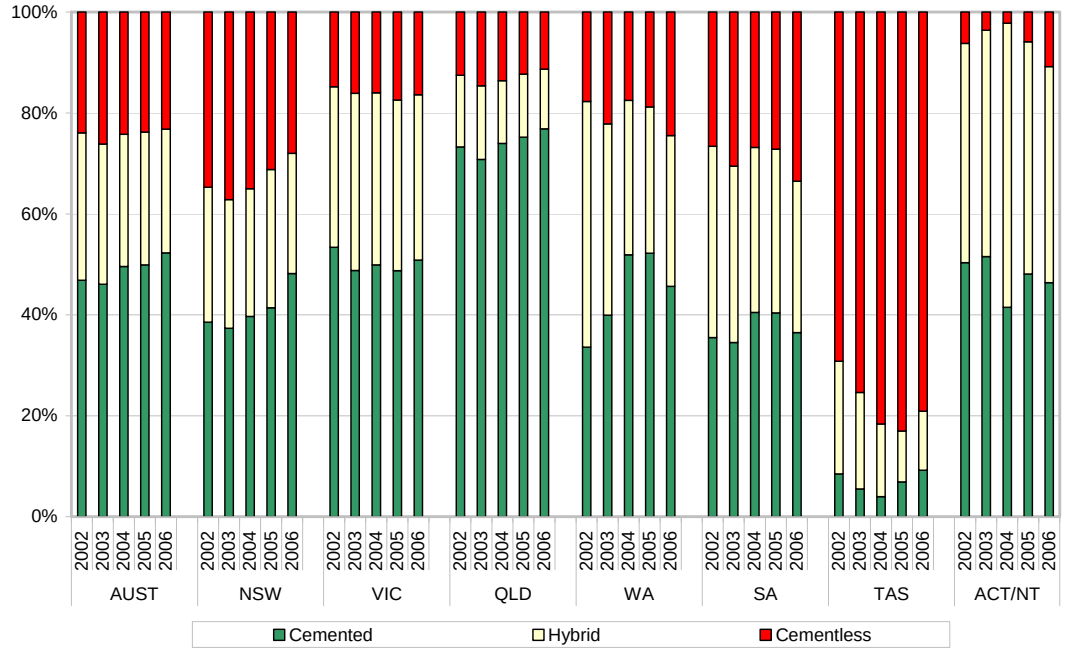


Figure KT6: Trends in Patella Usage and fixation for Primary Total Knee Replacement by State and Territory

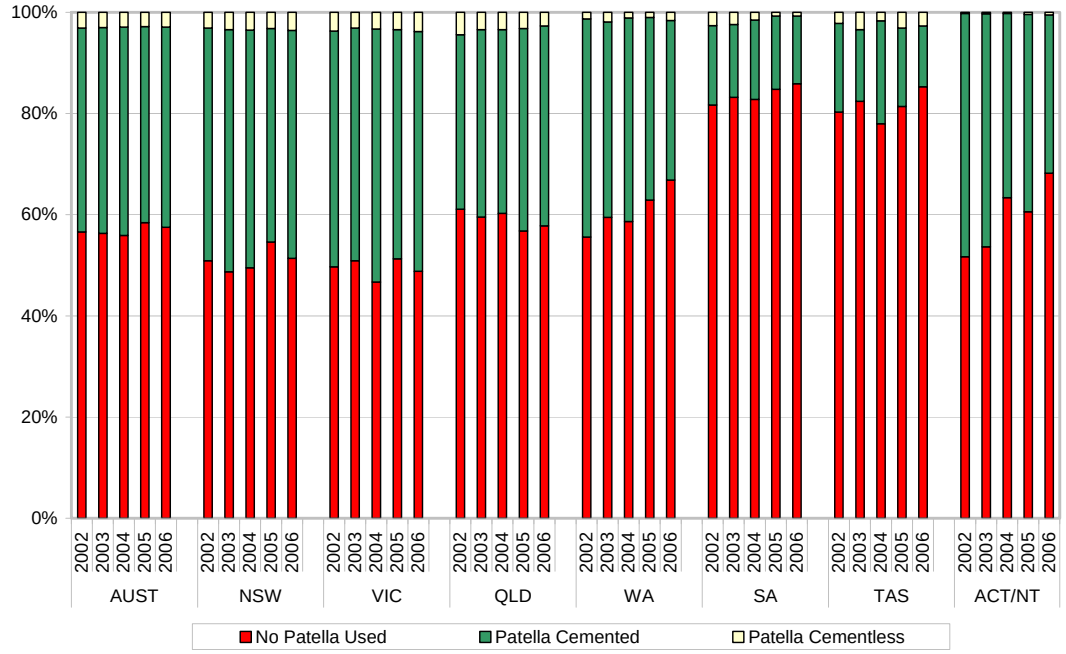
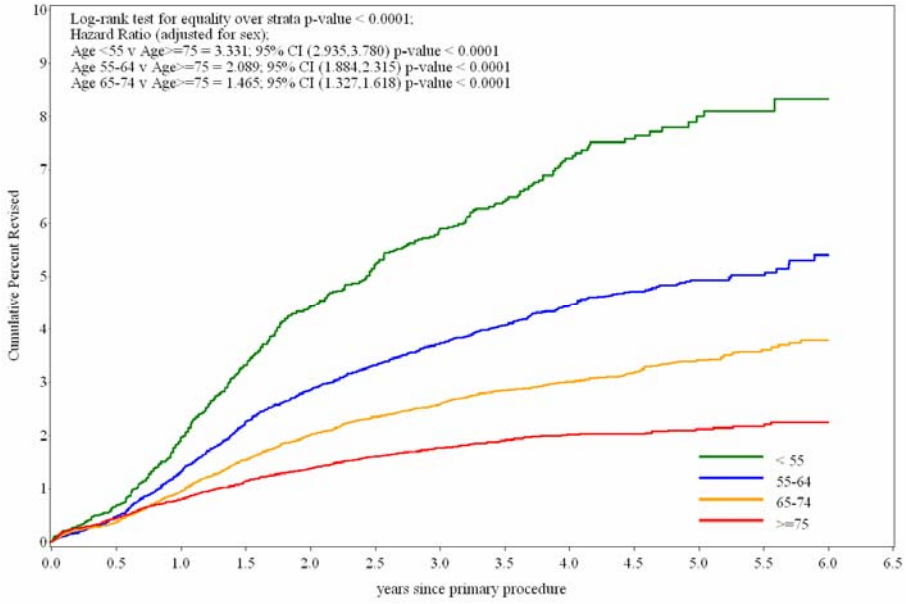


Table KT8: Primary Total Knee Procedures Requiring Revision by Age (primary diagnosis OA)

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<55	394	8187	4.8	21307	1.8	(1.67, 2.04)
55-64	885	29677	3.0	76077	1.2	(1.09, 1.24)
65-74	1071	49540	2.2	133006	0.8	(0.76, 0.85)
75+	616	42973	1.4	111947	0.6	(0.51, 0.60)
Total	**2966**	**130377**	**2.3**	**342337**	**0.9**	**(0.84, 0.90)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
<55	8187	7254	6399	5524	4704	3959	3261	2570	1950	1397	878	452	220
55-64	29677	26170	22866	19651	16633	13951	11467	9239	6954	4960	3070	1653	779
65-74	49540	44352	39090	34115	29163	24684	20416	16567	12637	9280	5892	3308	1562
75+	42973	38350	33590	29109	24515	20710	16920	13500	10183	7335	4567	2505	1115

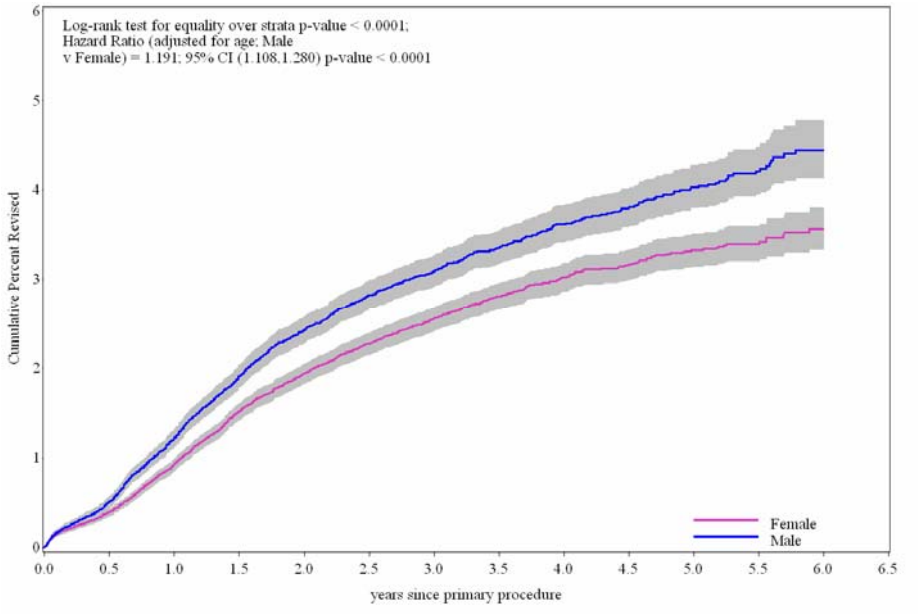
Table KT9: Yearly cumulative percentage revision of Primary Total Procedures by Age (primary diagnosis OA)

Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
<55	2.0 (1.7, 2.3)	4.4 (3.9, 5.0)	5.9 (5.3, 6.5)	7.2 (6.5, 8.0)	8.0 (7.2, 8.9)
55-64	1.3 (1.2, 1.5)	2.9 (2.6, 3.1)	3.7 (3.5, 4.0)	4.4 (4.1, 4.8)	4.9 (4.6, 5.3)
65-74	1.0 (0.9, 1.1)	2.0 (1.9, 2.2)	2.6 (2.4, 2.8)	3.0 (2.8, 3.2)	3.4 (3.2, 3.7)
75+	0.8 (0.7, 0.9)	1.4 (1.3, 1.5)	1.8 (1.6, 1.9)	2.0 (1.9, 2.2)	2.1 (1.9, 2.3)

Table KT10: Primary Total 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	1541	74418	2.1	195636	0.8	(0.75, 0.83)
Male	1425	55959	2.5	146701	1.0	(0.92, 1.02)
Total	**2966**	**130377**	**2.3**	**342337**	**0.9**	**(0.84, 0.90)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Female	74418	66327	58279	50591	42881	36215	29763	23942	18054	13116	8181	4525	2072
Male	55959	49799	43666	37808	32134	27089	22301	17934	13670	9856	6226	3393	1604

Table KT11: Yearly Cumulative percentage revision of Primary Total Procedures by Sex (primary diagnosis OA)

Sex	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Female	0.9 (0.9, 1.0)	1.9 (1.8, 2.1)	2.5 (2.4, 2.7)	3.0 (2.9, 3.2)	3.3 (3.1, 3.5)
Male	1.2 (1.1, 1.3)	2.4 (2.3, 2.6)	3.1 (2.9, 3.3)	3.6 (3.4, 3.8)	4.0 (3.8, 4.3)

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	206	4545	4.5	11702	1.8	(1.53, 2.02)
Female 55-64	434	16161	2.7	41149	1.1	(0.96, 1.16)
Female 65-74	558	27849	2.0	74842	0.7	(0.68, 0.81)
Female >= 75	343	25863	1.3	67943	0.5	(0.45, 0.56)
Males by Age						
Male <55	188	3642	5.2	9605	2.0	(1.69, 2.26)
Male 55-64	451	13516	3.3	34928	1.3	(1.17, 1.42)
Male 65-74	513	21691	2.4	58164	0.9	(0.81, 0.96)
Male >= 75	273	17110	1.6	44004	0.6	(0.55, 0.70)
Total	**2966**	**130377**	**2.3**	**342337**	**0.9**	**(0.84, 0.90)**

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

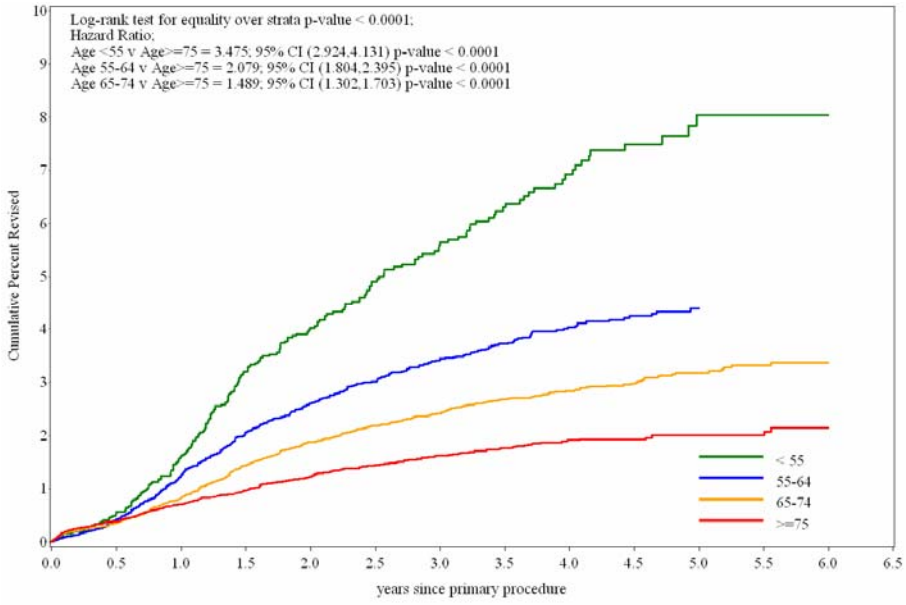
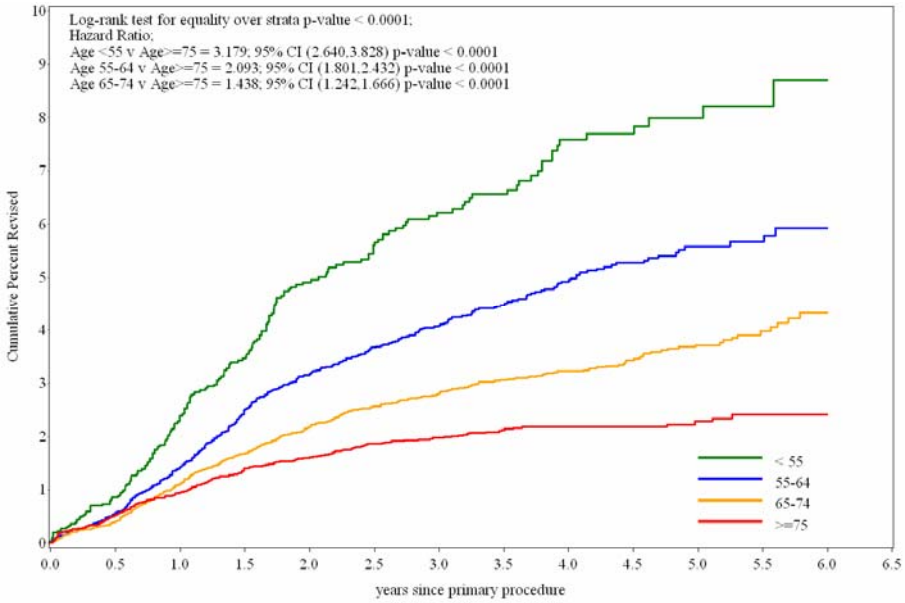


Figure KT10: Cumulative percentage revision of Primary Total Procedures by Males



Sex and Age	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Females by Age													
Female <55	4545	4010	3533	3057	2602	2162	1769	1398	1068	742	456	244	116
Female 55-64	16161	14249	12436	10693	9023	7550	6186	4931	3673	2604	1603	871	397
Female 65-74	27849	24941	21999	19186	16350	13858	11476	9367	7088	5261	3340	1910	893
Female >= 75	25863	23127	20311	17655	14906	12645	10332	8246	6225	4509	2782	1500	666
Males by Age													
Male <55	3642	3244	2866	2467	2102	1797	1492	1172	882	655	422	208	104
Male 55-64	13516	11921	10430	8958	7610	6401	5281	4308	3281	2356	1467	782	382
Male 65-74	21691	19411	17091	14929	12813	10826	8940	7200	5549	4019	2552	1398	669
Male >= 75	17110	15223	13279	11454	9609	8065	6588	5254	3958	2826	1785	1005	449

Table KT13: Yearly cumulative percentage revision of Primary Total Procedures by Sex and Age (primary diagnosis OA)

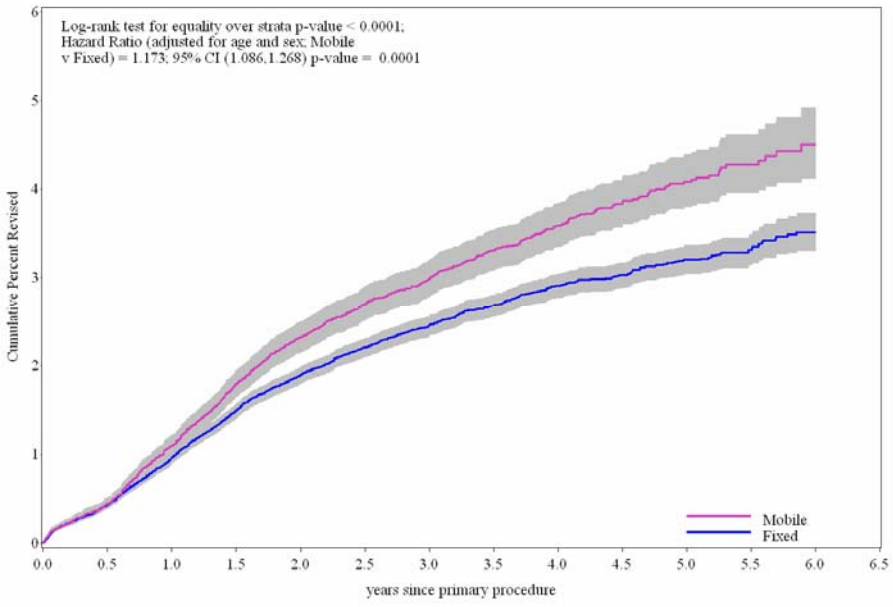
Sex and Age	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Females by Age					
Female <55	1.6 (1.2, 2.0)	4.0 (3.4, 4.7)	5.6 (4.8, 6.5)	6.9 (6.0, 8.0)	8.0 (6.9, 9.4)
Female 55-64	1.2 (1.1, 1.4)	2.6 (2.3, 2.9)	3.4 (3.1, 3.8)	4.0 (3.6, 4.5)	4.4 (3.9, 4.9)
Female 65-74	0.8 (0.7, 1.0)	1.9 (1.7, 2.1)	2.4 (2.2, 2.6)	2.8 (2.6, 3.1)	3.2 (2.9, 3.5)
Female >= 75	0.7 (0.6, 0.8)	1.2 (1.1, 1.4)	1.6 (1.4, 1.8)	1.9 (1.7, 2.2)	2.0 (1.8, 2.3)
Males by Age					
Male <55	2.4 (1.9, 3.0)	4.9 (4.2, 5.8)	6.2 (5.4, 7.2)	7.6 (6.5, 8.8)	8.0 (6.9, 9.3)
Male 55-64	1.4 (1.2, 1.6)	3.2 (2.8, 3.5)	4.1 (3.7, 4.5)	4.9 (4.5, 5.4)	5.6 (5.0, 6.2)
Male 65-74	1.1 (1.0, 1.3)	2.2 (2.0, 2.4)	2.8 (2.6, 3.1)	3.2 (2.9, 3.5)	3.7 (3.4, 4.1)
Male >= 75	0.9 (0.8, 1.1)	1.6 (1.4, 1.8)	2.0 (1.7, 2.2)	2.2 (1.9, 2.5)	2.3 (2.0, 2.6)

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	1933	96082	2.0	252130	0.8	(0.73, 0.80)
Mobile	961	38236	2.5	101467	0.9	(0.89, 1.01)
Total	**2894**	**134318**	**2.2**	**353597**	**0.8**	**(0.79, 0.85)**

***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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Fixed	96082	85527	74936	64979	55015	46455	38368	30911	23485	17048	10717	5995	2773
Mobile	38236	34120	30168	26274	22439	18967	15444	12410	9447	6874	4298	2260	1065

Table KT15: Yearly cumulative percentage revision of Fixed and Mobile

Movement	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Fixed	1.0 (0.9, 1.0)	1.9 (1.8, 2.0)	2.4 (2.3, 2.6)	2.9 (2.8, 3.0)	3.2 (3.0, 3.4)
Mobile	1.1 (1.0, 1.2)	2.3 (2.2, 2.5)	3.0 (2.8, 3.2)	3.6 (3.4, 3.8)	4.1 (3.8, 4.4)

***Note:** Excludes procedures with cementless Profix and Genesis Oxinium femoral components*

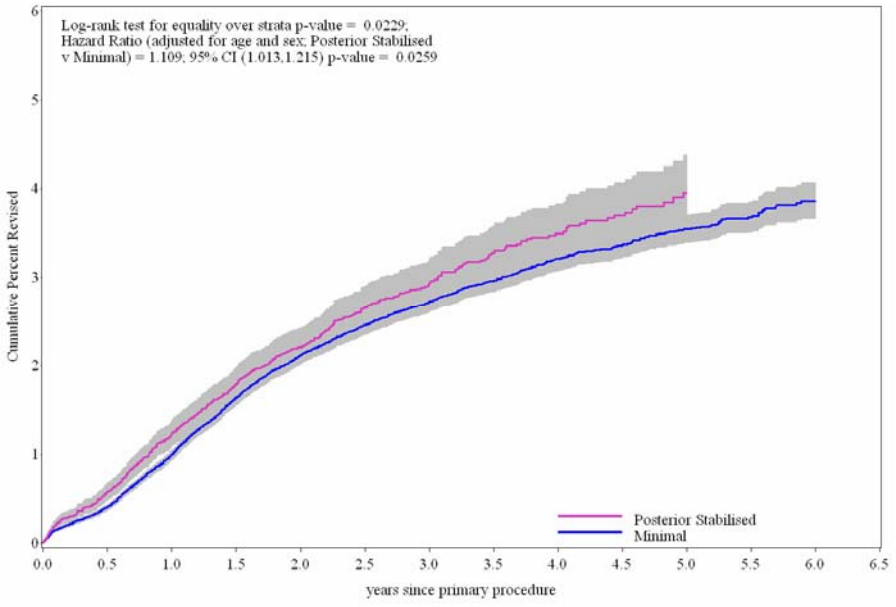
Table KT16: Total Primary Knee Procedures requiring Revision by Movement

Movement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Fixed	1999	96266	2.1	252617	0.8	(0.76, 0.83)
Rotating	932	33443	2.8	85412	1.1	(1.02, 1.16)
Rotating - Sliding	100	4096	2.4	12212	0.8	(0.67, 1.00)
Sliding	38	947	4.0	4509	0.8	(0.60, 1.16)
Unknown	2	47	4.3	170	1.2	(0.14, 4.25)
Total	**3071**	**134799**	**2.3**	**354921**	**0.9**	**(0.83, 0.90)**

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	2469	107677	2.3	294826	0.8	(0.80, 0.87)
Posterior Stabilised	569	26378	2.2	58260	1.0	(0.90, 1.06)
Fully Stabilised	15	444	3.4	1142	1.3	(0.74, 2.17)
Hinged	16	253	6.3	524	3.1	(1.75, 4.96)
Unknown	2	47	4.3	170	1.2	(0.14, 4.25)
Total	**3071**	**134799**	**2.3**	**354921**	**0.9**	**(0.83, 0.90)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Minimal	107671	97118	86174	75417	64719	55352	46044	37392	28560	20854	13218	7240	3392
Posterior Stabilised	26375	22347	18778	15714	12653	10016	7751	5926	4276	2980	1742	983	432

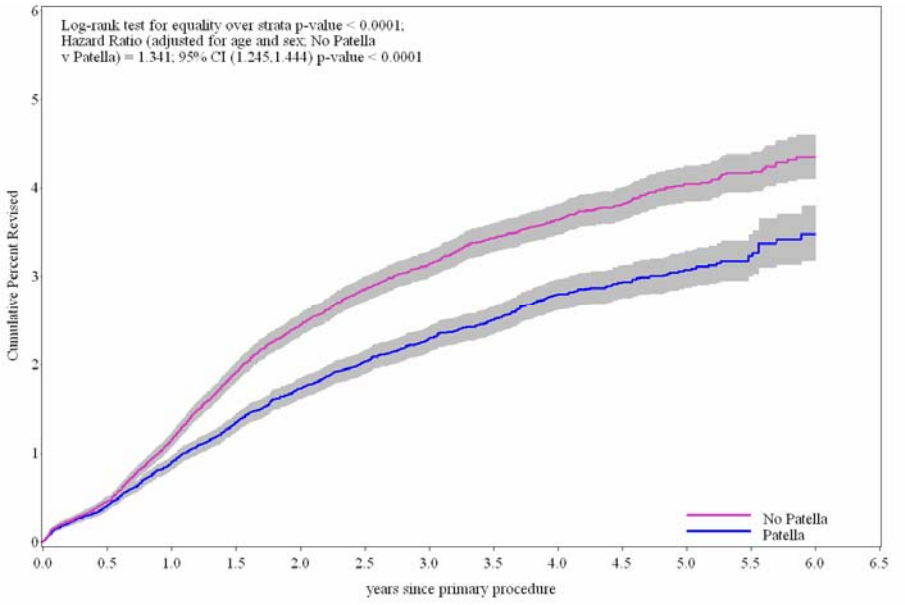
Table KT18: Yearly Cumulative percentage revision of Stability

Stability	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Minimal	1.0 (0.9, 1.1)	2.1 (2.0, 2.2)	2.7 (2.6, 2.8)	3.2 (3.1, 3.3)	3.5 (3.4, 3.7)
Posterior Stabilised	1.2 (1.1, 1.4)	2.2 (2.0, 2.4)	2.9 (2.7, 3.2)	3.5 (3.2, 3.8)	4.0 (3.6, 4.4)

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	1979	77440	2.6	204453	1.0	(0.93, 1.01)
Patella Used	1092	57359	1.9	150468	0.7	(0.68, 0.77)
Total	**3071**	**134799**	**2.3**	**354921**	**0.9**	**(0.83, 0.90)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Patella Not Used	77440	68979	60525	52312	44255	37499	30995	25140	19173	14101	9069	5235	2603
Patella Used	57359	51132	44988	39286	33509	28205	23082	18410	13834	9839	5958	3029	1237

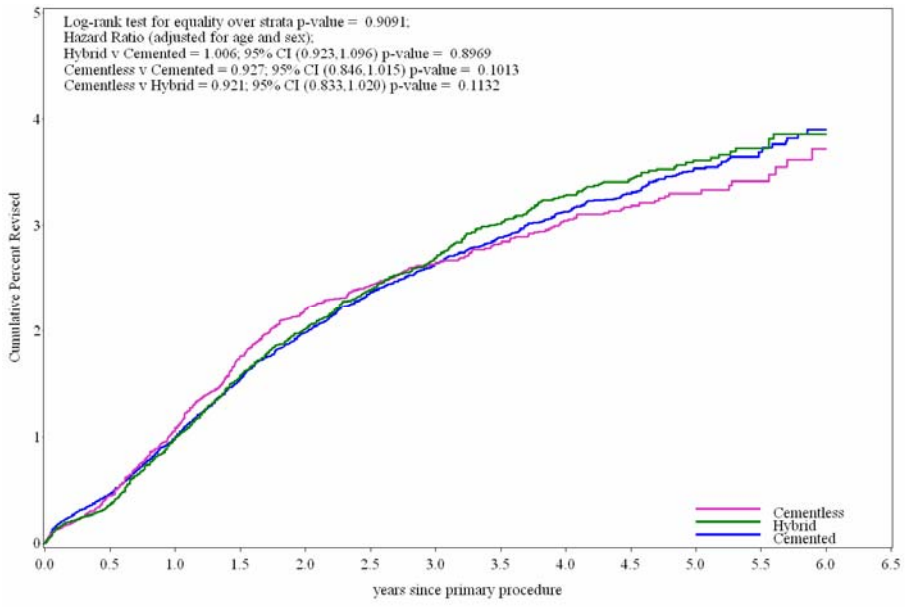
Table KT20: Yearly cumulative percentage revision of Patella Usage

Patella Usage	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Patella Not Used	1.2 (1.1, 1.2)	2.5 (2.3, 2.6)	3.1 (3.0, 3.3)	3.6 (3.5, 3.8)	4.0 (3.9, 4.3)
Patella Used	0.9 (0.8, 1.0)	1.7 (1.6, 1.9)	2.3 (2.1, 2.4)	2.8 (2.6, 3.0)	3.1 (2.9, 3.3)

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	1430	66628	2.1	172686	0.8	(0.79, 0.87)
Cementless	689	31697	2.2	82825	0.8	(0.77, 0.90)
Hybrid	827	36218	2.3	98756	0.8	(0.78, 0.90)
Total	**2946**	**134543**	**2.2**	**354267**	**0.8**	**(0.80, 0.86)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Cemented	66628	58782	51355	44514	37586	31470	25844	20840	16069	11931	7656	4215	1913
Cementless	31697	28277	24941	21579	18373	15540	12724	10033	7396	5159	3109	1684	822
Hybrid	36218	32805	29001	25331	21656	18563	15383	12567	9509	6850	4262	2365	1105

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*	*5 years*
Cemented	1.0 (0.9, 1.1)	2.0 (1.9, 2.1)	2.6 (2.5, 2.8)	3.1 (3.0, 3.3)	3.5 (3.3, 3.8)
Cementless	1.1 (1.0, 1.2)	2.2 (2.0, 2.4)	2.6 (2.4, 2.9)	3.0 (2.8, 3.3)	3.3 (3.0, 3.6)
Hybrid	1.0 (0.9, 1.1)	2.0 (1.9, 2.2)	2.7 (2.5, 2.9)	3.3 (3.0, 3.5)	3.6 (3.4, 3.9)

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	55	2384	2.3	7477	0.7	(0.55, 0.96)
Advance	Advance	27	479	5.6	1677	1.6	(1.06, 2.34)
Duracon	Duracon	155	7067	2.2	20162	0.8	(0.65, 0.90)
Genesis II	Genesis II	211	10437	2.0	25979	0.8	(0.71, 0.93)
Genesis II	Mobile Bearing	15	432	3.5	1227	1.2	(0.68, 2.02)
Genesis II Oxinium	Genesis II	46	2166	2.1	2832	1.6	(1.19, 2.17)
I/B II	I/B II	17	199	8.5	1033	1.6	(0.96, 2.64)
Kinemax Plus	Kinemax Plus	36	1583	2.3	5839	0.6	(0.43, 0.85)
LCS	LCS	157	4082	3.8	15811	1.0	(0.84, 1.16)
LCS	MBT	27	2085	1.3	4293	0.6	(0.41, 0.92)
Maxim	Maxim	16	506	3.2	1493	1.1	(0.61, 1.74)
Natural Knee	Natural Knee	14	984	1.4	2967	0.5	(0.26, 0.79)
Nexgen	Nexgen	55	5130	1.1	13499	0.4	(0.31, 0.53)
Nexgen LPS	Nexgen	80	3603	2.2	12020	0.7	(0.53, 0.83)
Nexgen LPS Flex	Nexgen	75	5361	1.4	9077	0.8	(0.65, 1.04)
Nexgen MBK	Nexgen MBK	12	296	4.1	1431	0.8	(0.43, 1.46)
Optetrak-PS	Optetrak	31	798	3.9	1504	2.1	(1.40, 2.93)
PFC Sigma	PFC Sigma	108	6955	1.6	15689	0.7	(0.56, 0.83)
Profix	Profix	69	3106	2.2	7739	0.9	(0.69, 1.13)
Scorpio	Scorpio/Series 7000	91	4128	2.2	10707	0.8	(0.68, 1.04)
Other (93)	-	133	4847	2.7	10229	1.3	(1.09, 1.54)
Total		**1430**	**66628**	**2.1**	**172686**	**0.8**	**(0.79, 0.87)**

Note: *Only prostheses with over 1,000 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*	*5 years*
AGC	AGC	0.7 (0.4, 1.2)	1.8 (1.3, 2.5)	2.4 (1.8, 3.2)	3.1 (2.3, 4.1)	3.4 (2.6, 4.6)
Advance	Advance	2.2 (1.2, 4.1)	5.9 (4.0, 8.6)	5.9 (4.0, 8.6)	6.2 (4.3, 9.0)	6.6 (4.5, 9.5)
Duracon	Duracon	1.0 (0.8, 1.2)	1.8 (1.5, 2.2)	2.5 (2.1, 2.9)	3.1 (2.6, 3.6)	3.3 (2.8, 4.0)
Genesis II	Genesis II	1.0 (0.8, 1.2)	1.8 (1.6, 2.2)	2.6 (2.2, 3.0)	2.9 (2.5, 3.4)	3.5 (3.0, 4.2)
Genesis II	Mobile Bearing	1.7 (0.8, 3.6)	3.5 (2.0, 6.0)	3.9 (2.3, 6.5)	3.9 (2.3, 6.5)	4.7 (2.7, 8.1)
Genesis II Oxinium	Genesis II	2.1 (1.5, 3.0)	3.3 (2.5, 4.5)	3.9 (2.8, 5.4)		
I/B II	I/B II	0	1.0 (0.3, 4.0)	3.0 (1.4, 6.7)	4.6 (2.4, 8.7)	7.2 (4.2, 12.1)
Kinemax Plus	Kinemax Plus	1.0 (0.6, 1.6)	1.9 (1.3, 2.7)	2.3 (1.6, 3.2)	2.6 (1.9, 3.6)	2.8 (2.0, 3.9)
LCS	LCS	1.0 (0.7, 1.3)	2.7 (2.2, 3.3)	3.6 (3.0, 4.3)	4.1 (3.5, 4.8)	4.7 (4.0, 5.5)
LCS	MBT	0.9 (0.5, 1.5)	1.7 (1.1, 2.5)	2.0 (1.3, 2.9)	2.0 (1.3, 2.9)	2.0 (1.3, 2.9)
Maxim	Maxim	1.2 (0.6, 2.8)	2.6 (1.5, 4.6)	3.0 (1.7, 5.1)	4.2 (2.5, 7.0)	
Natural Knee	Natural Knee	0.4 (0.2, 1.1)	1.2 (0.6, 2.2)	1.5 (0.8, 2.6)	2.1 (1.2, 3.6)	2.1 (1.2, 3.6)
Nexgen	Nexgen	0.4 (0.2, 0.6)	0.9 (0.6, 1.2)	1.3 (1.0, 1.7)	1.6 (1.2, 2.2)	1.8 (1.3, 2.4)
Nexgen LPS	Nexgen	0.9 (0.6, 1.3)	1.8 (1.4, 2.3)	2.1 (1.6, 2.7)	2.6 (2.1, 3.3)	2.8 (2.2, 3.6)
Nexgen LPS Flex	Nexgen	0.9 (0.7, 1.2)	1.8 (1.4, 2.3)	2.4 (1.8, 3.1)	2.4 (1.8, 3.1)	
Nexgen MBK	Nexgen MBK	0.7 (0.2, 2.7)	2.7 (1.4, 5.4)	2.7 (1.4, 5.4)	3.8 (2.1, 6.7)	4.3 (2.4, 7.4)
Optetrak-PS	Optetrak	2.2 (1.3, 3.7)	4.6 (3.1, 6.8)	6.1 (4.2, 8.9)		
PFC Sigma	PFC Sigma	0.9 (0.7, 1.2)	1.5 (1.2, 1.9)	2.0 (1.6, 2.5)	2.4 (2.0, 3.0)	3.0 (2.4, 3.9)
Profix	Profix	1.3 (0.9, 1.8)	2.2 (1.7, 2.8)	2.9 (2.3, 3.7)	3.1 (2.4, 4.0)	3.1 (2.4, 4.0)
Scorpio	Scorpio/Series 7000	1.0 (0.7, 1.4)	1.9 (1.5, 2.4)	2.6 (2.1, 3.3)	3.4 (2.7, 4.3)	3.4 (2.7, 4.3)
Other (93)	-	1.5 (1.1, 1.9)	2.9 (2.3, 3.5)	4.3 (3.5, 5.2)	5.1 (4.2, 6.1)	5.7 (4.7, 6.9)

Note*: Cumulative Percent Revised equal to 0 indicates that the prosthesis combination has been followed up to this time with no revisions recorded*

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	58	2090	2.8	4962	1.2	(0.89, 1.51)
Advantim	Advantim	7	498	1.4	1663	0.4	(0.17, 0.87)
Duracon	Duracon	63	2586	2.4	7518	0.8	(0.64, 1.07)
Genesis II	Mobile Bearing	12	458	2.6	1759	0.7	(0.35, 1.19)
LCS	LCS	84	2300	3.7	9790	0.9	(0.68, 1.06)
LCS	MBT	131	7443	1.8	15404	0.9	(0.71, 1.01)
Maxim	Maxim	19	571	3.3	2106	0.9	(0.54, 1.41)
Natural Knee	Natural Knee	42	1678	2.5	5625	0.7	(0.54, 1.01)
Nexgen	Nexgen	69	4913	1.4	12777	0.5	(0.42, 0.68)
PFC Sigma	Coordinate	17	828	2.1	1989	0.9	(0.50, 1.37)
PFC Sigma	MBT	20	879	2.3	1796	1.1	(0.68, 1.72)
Profix	Profix	17	767	2.2	2081	0.8	(0.48, 1.31)
RBK	RBK	29	1583	1.8	3557	0.8	(0.55, 1.17)
Rotaglide Plus	Rotaglide Plus	9	319	2.8	1024	0.9	(0.40, 1.67)
Scorpio	Scorpio/Series 7000	54	2813	1.9	6862	0.8	(0.59, 1.03)
Other (44)	-	183	2227	8.2	4565	4.0	(3.45, 4.63)
Total		**814**	**31953**	**2.5**	**83478**	**1.0**	**(0.91, 1.04)**

Note: *Only prostheses with over 1,000 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*	*5 years*
Active Knee	Active Knee	1.2 (0.8, 1.7)	3.0 (2.3, 4.0)	3.2 (2.4, 4.1)	3.9 (2.9, 5.1)	
Advantim	Advantim	0.4 (0.1, 1.8)	1.2 (0.5, 3.0)	1.9 (0.9, 3.9)	1.9 (0.9, 3.9)	1.9 (0.9, 3.9)
Duracon	Duracon	1.0 (0.7, 1.5)	2.2 (1.6, 2.9)	2.9 (2.2, 3.7)	3.4 (2.7, 4.4)	3.4 (2.7, 4.4)
Genesis II	Mobile Bearing	1.4 (0.6, 3.0)	1.4 (0.6, 3.0)	1.9 (1.0, 3.8)	2.6 (1.4, 4.9)	3.0 (1.7, 5.5)
LCS	LCS	1.4 (1.0, 2.0)	2.7 (2.1, 3.5)	3.2 (2.5, 4.0)	3.7 (2.9, 4.6)	4.0 (3.2, 4.9)
LCS	MBT	0.9 (0.7, 1.2)	2.1 (1.8, 2.6)	2.4 (2.0, 2.8)	2.7 (2.2, 3.3)	3.4 (2.5, 4.5)
Maxim	Maxim	1.8 (1.0, 3.3)	2.7 (1.6, 4.5)	3.3 (2.1, 5.2)	3.6 (2.3, 5.6)	3.6 (2.3, 5.6)
Natural Knee	Natural Knee	1.1 (0.7, 1.7)	2.0 (1.4, 2.8)	2.4 (1.7, 3.3)	2.9 (2.1, 4.0)	3.2 (2.3, 4.6)
Nexgen	Nexgen	0.8 (0.5, 1.1)	1.4 (1.1, 1.8)	1.9 (1.5, 2.4)	2.0 (1.6, 2.6)	2.1 (1.6, 2.7)
PFC Sigma	Coordinate	0.7 (0.3, 1.8)	1.6 (0.9, 3.0)	2.5 (1.4, 4.3)	3.7 (2.2, 6.2)	
PFC Sigma	MBT	1.5 (0.8, 2.7)	2.9 (1.8, 4.5)	3.2 (2.0, 5.0)	3.7 (2.3, 5.9)	
Profix	Profix	1.0 (0.5, 2.2)	2.7 (1.7, 4.5)	2.7 (1.7, 4.5)	2.7 (1.7, 4.5)	3.6 (2.0, 6.4)
RBK	RBK	0.8 (0.4, 1.4)	1.8 (1.2, 2.7)	2.5 (1.7, 3.7)	3.2 (2.1, 4.9)	
Rotaglide Plus	Rotaglide Plus	0.7 (0.2, 2.7)	1.8 (0.8, 4.3)	3.2 (1.6, 6.3)	3.8 (2.0, 7.4)	3.8 (2.0, 7.4)
Scorpio	Scorpio/Series 7000	1.2 (0.9, 1.7)	2.2 (1.7, 2.9)	2.4 (1.9, 3.2)	2.6 (1.9, 3.4)	2.9 (2.1, 3.9)
Other (44)	-	4.2 (3.3, 5.3)	10.9 (9.3, 12.7)	13.7 (11.9, 15.8)	14.4 (12.5, 16.6)	14.7 (12.7, 16.9)

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	15	1031	1.5	3590	0.4	(0.23, 0.69)
Active Knee	Active Knee	10	661	1.5	1182	0.8	(0.41, 1.56)
Duracon	Duracon	156	6352	2.5	19769	0.8	(0.67, 0.92)
Genesis II	Genesis II	66	2682	2.5	6798	1.0	(0.75, 1.24)
LCS	LCS	64	2153	3.0	7899	0.8	(0.62, 1.03)
LCS	MBT	26	1799	1.4	3452	0.8	(0.49, 1.10)
Maxim	Maxim	22	1079	2.0	2609	0.8	(0.53, 1.28)
Natural Knee	Natural Knee	19	1082	1.8	3658	0.5	(0.31, 0.81)
Nexgen	Nexgen	58	4394	1.3	10483	0.6	(0.42, 0.72)
Nexgen LPS	Nexgen	7	494	1.4	1164	0.6	(0.24, 1.24)
PFC Sigma	PFC Sigma	98	4191	2.3	11247	0.9	(0.71, 1.06)
Profix	Mobile Bearing	26	579	4.5	1548	1.7	(1.10, 2.46)
Profix	Profix	16	646	2.5	1742	0.9	(0.52, 1.49)
Scorpio	Scorpio/Series 7000	102	5439	1.9	14550	0.7	(0.57, 0.85)
Other (74)	-	142	3636	3.9	9066	1.6	(1.32, 1.85)
Total		**827**	**36218**	**2.3**	**98756**	**0.8**	**(0.78, 0.90)**

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

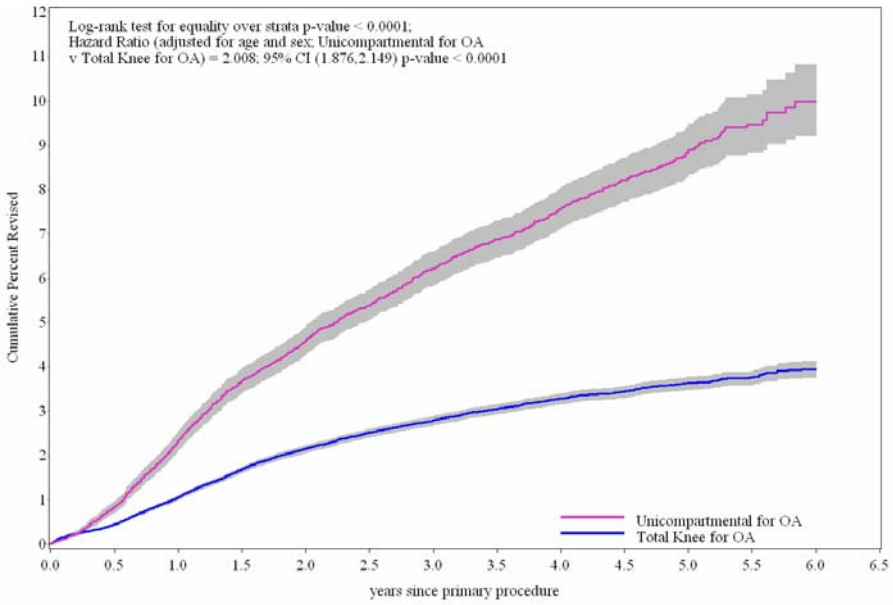
Table KT28: Yearly cumulative percentage revision of Hybrid Fixation

Femoral Component	*Tibial Component*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
AGC	AGC	0.7 (0.3, 1.5)	1.2 (0.7, 2.1)	1.3 (0.8, 2.4)	1.6 (0.9, 2.7)	2.1 (1.2, 3.6)
Active Knee	Active Knee	0.5 (0.2, 1.4)	1.8 (0.9, 3.7)	2.9 (1.5, 5.7)		
Duracon	Duracon	1.1 (0.9, 1.4)	2.1 (1.7, 2.5)	2.6 (2.2, 3.1)	3.0 (2.6, 3.6)	3.3 (2.8, 3.9)
Genesis II	Genesis II	1.2 (0.8, 1.7)	2.5 (1.9, 3.3)	3.2 (2.5, 4.1)	3.7 (2.9, 4.7)	4.0 (3.0, 5.2)
LCS	LCS	1.0 (0.6, 1.5)	1.8 (1.3, 2.4)	2.4 (1.8, 3.1)	3.2 (2.4, 4.1)	3.8 (2.9, 4.9)
LCS	MBT	0.6 (0.3, 1.2)	1.8 (1.2, 2.8)	2.5 (1.6, 3.8)	3.0 (2.0, 4.5)	
Maxim	Maxim	0.7 (0.3, 1.4)	2.1 (1.3, 3.3)	2.5 (1.6, 3.9)	2.8 (1.8, 4.4)	
Natural Knee	Natural Knee	0.7 (0.3, 1.4)	1.6 (1.0, 2.6)	1.7 (1.1, 2.7)	2.1 (1.3, 3.3)	2.1 (1.3, 3.3)
Nexgen	Nexgen	0.5 (0.3, 0.8)	1.3 (1.0, 1.8)	1.8 (1.4, 2.4)	2.2 (1.7, 3.0)	2.5 (1.9, 3.4)
Nexgen LPS	Nexgen	0.3 (0.0, 2.0)	0.3 (0.0, 2.0)	1.2 (0.4, 3.8)	3.3 (1.4, 7.5)	
PFC Sigma	PFC Sigma	1.2 (0.9, 1.6)	2.3 (1.9, 2.9)	2.6 (2.1, 3.2)	3.4 (2.7, 4.2)	3.6 (2.9, 4.5)
Profix	Mobile Bearing	1.4 (0.7, 2.9)	3.4 (2.1, 5.4)	5.1 (3.3, 7.9)	7.0 (4.5, 10.7)	
Profix	Profix	1.2 (0.6, 2.5)	2.1 (1.1, 3.7)	3.2 (1.9, 5.4)	3.6 (2.2, 6.0)	
Scorpio	Scorpio/Series 7000	0.8 (0.6, 1.1)	1.4 (1.1, 1.8)	2.3 (1.8, 2.8)	2.8 (2.3, 3.5)	3.2 (2.6, 4.0)
Other (74)	-	1.9 (1.4, 2.4)	3.8 (3.2, 4.7)	5.6 (4.7, 6.6)	6.4 (5.4, 7.5)	6.6 (5.5, 7.8)

Table KT29: 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	2966	130377	2.3	342337	0.9	(0.84, 0.90)
Unicompartmental for OA	1219	21742	5.6	60468	2.0	(1.90, 2.13)
Total	**4185**	**152119**	**2.8**	**402806**	**1.0**	**(1.01, 1.07)**

Figure KT15: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Total Knee	130377	116126	101945	88399	75015	63304	52064	41876	31724	22972	14407	7918	3676
Unicompartmental	21742	19822	17689	15597	13558	11682	9798	7856	5901	4086	2484	1233	507

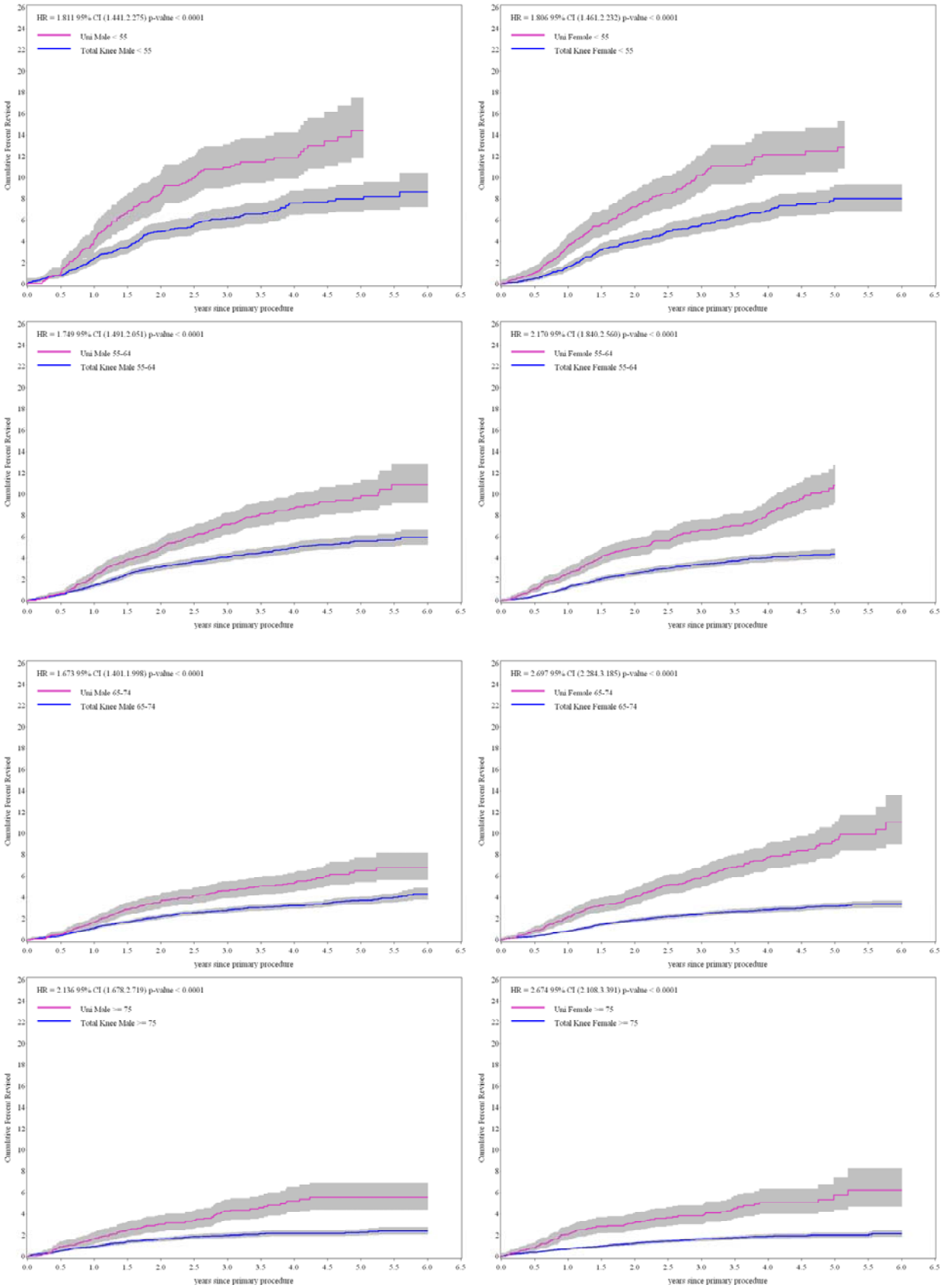
Table KT30: Yearly cumulative percentage revision of Unicompartmental Procedures and Total Knee (primary diagnosis Osteoarthritis)

Type of knee replacement	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Total Knee	1.1 (1.0, 1.1)	2.1 (2.1, 2.2)	2.8 (2.7, 2.9)	3.3 (3.2, 3.4)	3.6 (3.5, 3.8)
Unicompartmental	2.3 (2.1, 2.5)	4.6 (4.3, 4.9)	6.2 (5.9, 6.6)	7.6 (7.1, 8.0)	8.9 (8.4, 9.5)

Table KT31: 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	206	4545	4.5	11702	1.8	(1.53, 2.02)
Uni <55	146	1723	8.5	4613	3.2	(2.67, 3.72)
Total Knee 55-64	434	16161	2.7	41149	1.1	(0.96, 1.16)
Uni 55-64	208	3413	6.1	9086	2.3	(1.99, 2.62)
Total Knee 65-74	558	27849	2.0	74842	0.7	(0.68, 0.81)
Uni 65-74	185	3222	5.7	9274	2.0	(1.72, 2.30)
Total Knee >= 75	343	25863	1.3	67943	0.5	(0.45, 0.56)
Uni >= 75	85	2252	3.8	6380	1.3	(1.06, 1.65)
Total	**2165**	**85028**	**2.5**	**224989**	**1.0**	**(0.92, 1.00)**
Males for OA						
Total Knee <55	188	3642	5.2	9605	2.0	(1.69, 2.26)
Uni <55	121	1290	9.4	3425	3.5	(2.93, 4.22)
Total Knee 55-64	451	13516	3.3	34928	1.3	(1.17, 1.42)
Uni 55-64	227	3642	6.2	10052	2.3	(1.97, 2.57)
Total Knee 65-74	513	21691	2.4	58164	0.9	(0.81, 0.96)
Uni 65-74	160	3807	4.2	10956	1.5	(1.24, 1.70)
Total Knee >= 75	273	17110	1.6	44004	0.6	(0.55, 0.70)
Uni >= 75	87	2393	3.6	6682	1.3	(1.04, 1.61)
Total	**2020**	**67091**	**3.0**	**177816**	**1.1**	**(1.09, 1.19)**

Figures KT16-KT23: 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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Females for OA													
Total Knee <55	4545	4010	3533	3057	2602	2162	1769	1398	1068	742	456	244	116
Uni <55	1723	1568	1365	1179	1014	884	717	581	447	306	210	96	47
Total Knee 55-64	16161	14249	12436	10693	9023	7550	6186	4931	3673	2604	1603	871	397
Uni 55-64	3413	3101	2729	2385	2024	1738	1417	1126	831	570	324	163	58
Total Knee 65-74	27849	24941	21999	19186	16350	13858	11476	9367	7088	5261	3340	1910	893
Uni 65-74	3222	2941	2634	2355	2065	1802	1547	1259	955	680	417	222	84
Total Knee >= 75	25863	23127	20311	17655	14906	12645	10332	8246	6225	4509	2782	1500	666
Uni >= 75	2252	2059	1866	1672	1458	1270	1046	831	605	421	243	115	57
Males for OA													
Total Knee <55	3642	3244	2866	2467	2102	1797	1492	1172	882	655	422	208	104
Uni <55	1290	1163	1009	867	759	643	547	449	335	221	133	63	26
Total Knee 55-64	13516	11921	10430	8958	7610	6401	5281	4308	3281	2356	1467	782	382
Uni 55-64	3642	3321	2960	2600	2253	1920	1632	1267	972	675	429	204	89
Total Knee 65-74	21691	19411	17091	14929	12813	10826	8940	7200	5549	4019	2552	1398	669
Uni 65-74	3807	3493	3149	2788	2464	2131	1829	1478	1110	774	476	243	93
Total Knee >= 75	17110	15223	13279	11454	9609	8065	6588	5254	3958	2826	1785	1005	449
Uni >= 75	2393	2176	1977	1751	1521	1294	1063	865	646	439	252	127	53

Table KT32: 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*	*5 years*
Females for OA					
Total Knee <55	1.6 (1.2, 2.0)	4.0 (3.4, 4.7)	5.6 (4.8, 6.5)	6.9 (6.0, 8.0)	8.0 (6.9, 9.4)
Uni <55	3.6 (2.8, 4.6)	7.2 (6.0, 8.8)	10.2 (8.6, 12.1)	12.2 (10.3, 14.3)	12.5 (10.6, 14.7)
Total Knee 55-64	1.2 (1.1, 1.4)	2.6 (2.3, 2.9)	3.4 (3.1, 3.8)	4.0 (3.6, 4.5)	4.4 (3.9, 4.9)
Uni 55-64	2.6 (2.1, 3.2)	4.9 (4.2, 5.8)	6.6 (5.7, 7.7)	8.2 (7.0, 9.5)	10.8 (9.2, 12.7)
Total 65-74	0.8 (0.7, 1.0)	1.9 (1.7, 2.1)	2.4 (2.2, 2.6)	2.8 (2.6, 3.1)	3.2 (2.9, 3.5)
Uni 65-74	2.2 (1.7, 2.8)	4.0 (3.4, 4.9)	5.9 (5.0, 6.9)	7.8 (6.7, 9.1)	9.5 (8.0, 11.1)
Total Knee >= 75	0.7 (0.6, 0.8)	1.2 (1.1, 1.4)	1.6 (1.4, 1.8)	1.9 (1.7, 2.2)	2.0 (1.8, 2.3)
Uni >= 75	2.1 (1.5, 2.8)	3.2 (2.5, 4.0)	3.8 (3.0, 4.8)	5.1 (4.0, 6.3)	5.7 (4.4, 7.4)
Males for OA					
Total Knee <55	2.4 (1.9, 3.0)	4.9 (4.2, 5.8)	6.2 (5.4, 7.2)	7.6 (6.5, 8.8)	8.0 (6.9, 9.3)
Uni <55	4.2 (3.2, 5.6)	8.5 (7.0, 10.4)	11.0 (9.1, 13.1)	11.9 (9.9, 14.2)	14.4 (11.8, 17.5)
Total Knee 55-64	1.4 (1.2, 1.6)	3.2 (2.8, 3.5)	4.1 (3.7, 4.5)	4.9 (4.5, 5.4)	5.6 (5.0, 6.2)
Uni 55-64	2.3 (1.8, 2.9)	4.9 (4.2, 5.8)	7.2 (6.2, 8.3)	8.7 (7.6, 9.9)	9.9 (8.5, 11.4)
Total Knee 65-74	1.1 (1.0, 1.3)	2.2 (2.0, 2.4)	2.8 (2.6, 3.1)	3.2 (2.9, 3.5)	3.7 (3.4, 4.1)
Uni 65-74	1.7 (1.3, 2.1)	3.6 (3.0, 4.4)	4.6 (3.9, 5.5)	5.3 (4.5, 6.3)	6.5 (5.5, 7.8)
Total Knee >= 75	0.9 (0.8, 1.1)	1.6 (1.4, 1.8)	2.0 (1.7, 2.2)	2.2 (1.9, 2.5)	2.3 (2.0, 2.6)
Uni >= 75	1.6 (1.2, 2.3)	3.0 (2.4, 3.9)	4.3 (3.4, 5.4)	5.2 (4.2, 6.5)	5.6 (4.4, 6.9)

Primary Total Knee Replacement Prostheses

with a higher than anticipated revision rate

Table KT33: Individual Primary Total Knee Prostheses with higher than anticipated revision rates either alone or in combination

Femoral Component	*Tibial Component*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Hazard Ratio*	*P Value*	*Exact 95%CI*
Gemini MK II	Gemini MK II	21	23.8	79	6.3	7.02	<0.001	(2.9, 16.9)
Interax	Interax	58	13.8	320	2.5	4.02	<0.001	(2.0, 8.1)
Optetrak-PS	Optetrak	909	4.0	1824	2.0	2.13	<0.001	(1.5, 3.0)
Profix	Mobile Bearing	1139	5.9	3074	2.2	2.27	<0.001	(1.8, 2.9)
Trac	Trac	138	8.7	678	1.8	2.33	0.003	(1.3, 4.1)
C/Less Genesis II Oxinium	Genesis II	105	38.1	282	14.2	13.61	<0.001	(10.0, 18.6)
C/Less Genesis II Oxinium	Mobile Bearing	88	52.3	208	22.2	20.41	<0.001	(15.2, 27.3)
C/Less Profix Oxinium	Profix	71	36.6	202	12.9	12.31	<0.001	(8.4, 18.1)
C/Less Profix Oxinium	Mobile Bearing	158	39.9	456	13.8	14.26	<0.001	(11.1, 18.3)

Note: *components have been compared to all other components, C/Less = cementless*

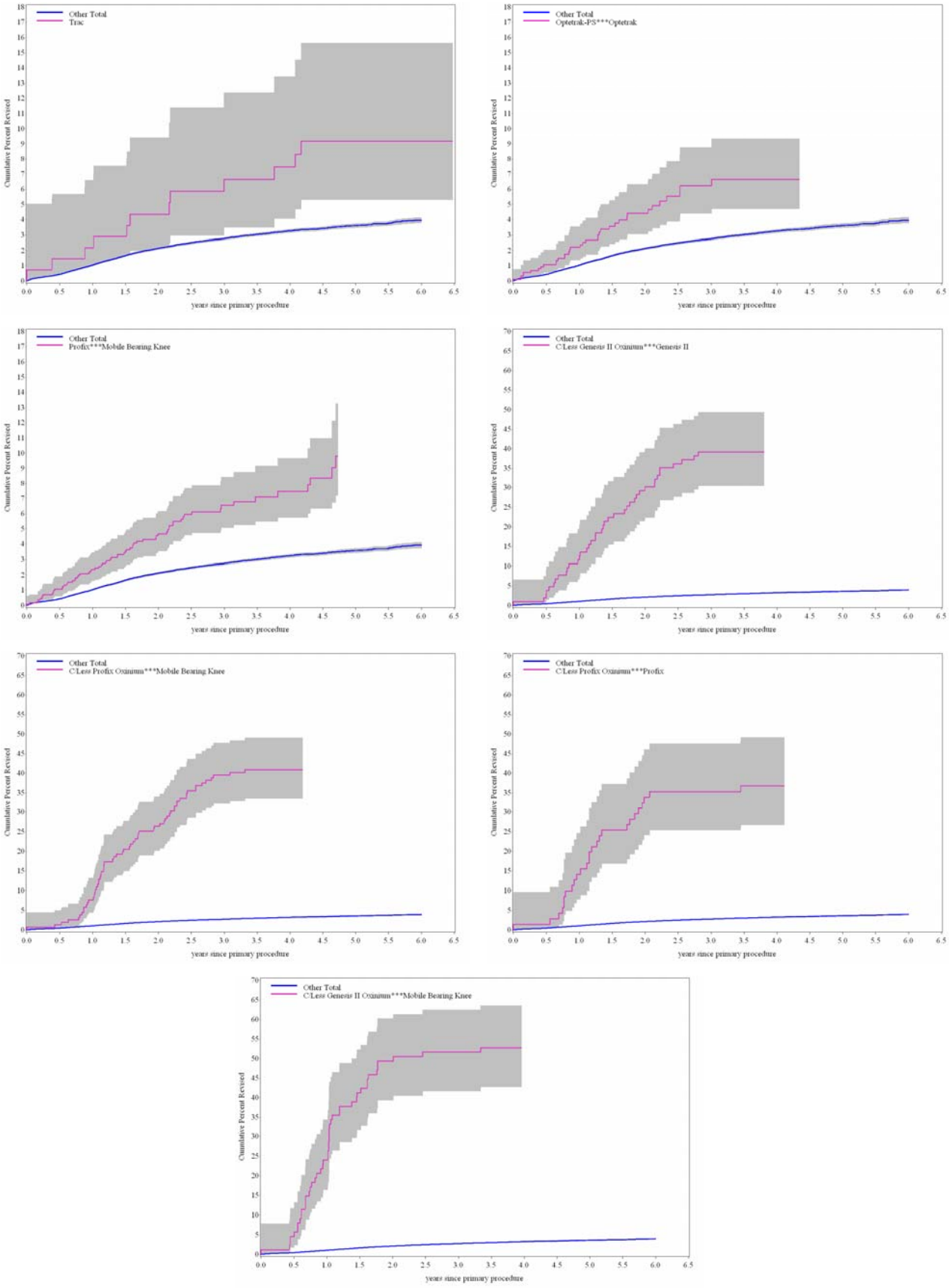
Table KT34: Yearly cumulative percentage revision of individual primary total knee prostheses that have been identified as having a higher than anticipated revision rate.

Femoral Component	*Tibial Component*	*Cumulative Percent Revised (95% CI)*				
		1 year	*2 years*	*3 years*	*4 years*	*5 years*
Gemini MK II	Gemini MK II	9.52 (2.47, 33.00)	14.3 (4.84, 38.03)	14.3 (4.84, 38.03)	23.8 (10.67, 48.06)	23.8 (10.67, 48.06)
Interax	Interax	1.79 (0.25, 12.01)	1.79 (0.25, 12.01)	5.36 (1.76, 15.70)	9.11 (3.89, 20.52)	11.1 (5.13, 23.05)
Optetrak-PS	Optetrak	2.21 (1.37, 3.54)	4.40 (3.05, 6.33)	6.23 (4.41, 8.78)	6.64 (4.70, 9.35)	
Profix	Mobile Bearing	2.36 (1.61, 3.45)	4.67 (3.54, 6.16)	6.54 (5.07, 8.43)	7.45 (5.73, 9.66)	
Trac	Trac	2.17 (0.71, 6.59)	4.35 (1.98, 9.42)	6.64 (3.51, 12.37)	7.46 (4.08, 13.43)	9.18 (5.31, 15.63)
C/Less Genesis II Oxinium	Genesis II	11.5 (6.72, 19.43)	30.2 (22.31, 40.11)	39.2 (30.47, 49.37)		
C/Less Genesis II Oxinium	Mobile Bearing	24.0 (16.34, 34.36)	49.3 (39.40, 60.22)	51.6 (41.64, 62.43)		
C/Less Profix Oxinium	Profix	14.1 (7.84, 24.60)	33.8 (24.10, 46.06)	35.2 (25.37, 47.54)	36.8 (26.73, 49.15)	
C/Less Profix Oxinium	Mobile Bearing	7.67 (4.43, 13.11)	26.4 (20.15, 34.04)	39.5 (32.29, 47.69)	40.8 (33.55, 49.04)	

Table KT35: Yearly Usage of individual primary total knee prostheses that have been identified as having a higher than anticipated revision rate.

Femoral Component	*Tibial Component*	*Year of Implant*							
		1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Gemini MK II	Gemini MK II			4	10	7			
Interax	Interax	10	30	18					
Optetrak-PS	Optetrak		14	22	89	129	155	249	251
Profix	Mobile Bearing Knee			55	213	204	349	266	52
Trac	Trac	7	36	52	33	9	1		
C/Less Genesis II Oxinium	Genesis II				3	102			
C/Less Genesis II Oxinium	Mobile Bearing Knee				22	66			
C/Less Profix Oxinium	Profix				10	61			
C/Less Profix Oxinium	Mobile Bearing Knee				63	95			

Figures KT24-KT30: Cumulative percentage revision of individual primary total knee prostheses that have been identified as having a higher than anticipated revision rate.



Revision Knee Replacement

This report is based on the analysis of 14,654 revision knee procedures recorded by the Registry. Included in this group of revisions is a subgroup containing 4,403 first revisions of known primary knee replacements. All have a procedure date prior to the end of 2006.

Revision knee 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. When only one of the femoral or tibial components are revised this is referred to as a partial major revision. If both are revised this is referred to as a total major revision. 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.

The major focus of this section of the report is to provide preliminary information on the outcome of the first revision of primary unicompartmental and total knee replacement. To achieve this effectively the Registry needs to have a full chronological list of procedures dating back to the original primary procedure. At this stage of the Registry's development it does not have data on the original primary for the majority of revisions it has recorded. This is because for most revision knee procedures the primary was performed prior to the commencement of the Registry. Not only is the Registry unaware of the original primary procedure it is not even certain if the first revision recorded, is the first revision procedure for that individual. As a consequence it is not possible to undertake an analysis of outcome based on the data of all revision procedures recorded by the Registry. Analysis of these data however is able to provide information on the types of revisions being undertaken, how that is changing and the reasons for those revisions.

There is however an increasing proportion of revision procedures where the Registry does have a record of the original primary and hence a full chronological list of all procedures subsequent to that primary. The Registry refers to this subgroup of revisions as 'revisions of known primary procedures'. These are revisions of any type of primary knee replacement recorded by the Registry. Currently this is 5,167 or 35.3% of all revisions, 4,403 of which are first revision procedures.

The outcome analysis reported in this section is based on determining the rate of subsequent revision of first revisions of known primary knees i.e. the re-revision rate.

Analysis of All Knee Revision Procedures

Type of revision knee procedures

The majority of knee revisions are major revisions (67.6%). The most common major revision is a major total revision involving both femoral and tibial components (70.9%). When a major partial revision is undertaken it usually involves revision of the tibial component (13% of all major revisions and 65.7% of major partial revisions) (Table KR1).

When primary partial knee replacements i.e. all types of partial knee replacement (unicompartment, patella/trochlear and unispacer) are revised this may be done by using partial or total knee prostheses. The small number of partial knee components used in revision procedures indicates that when primary partial knee replacement is revised this is most often to a total knee replacement (Table KR1).

The only other type of major revision that has a large number of procedures is when both components are removed and replaced with a cement spacer (5.1%) (Table KR1).

There are 4,745 minor revisions (32.4%). Insert only exchanges comprise 43.1% of this group. Of the remainder, 29.3% are patella resurfacing procedures and 24.8% are patella resurfacing plus insert exchange (Table KR2).

During the last five years there has been little change in the proportion of the different types of revision procedures reported to the Registry. There are however some minor state and territory variations in these proportions. Queensland, Victoria and NSW in general have a marginally lower rate of minor revision than the other states and territories with the exception of Tasmania which decreased its minor revision rate from 43.8% in 2005 to 19.1% in 2006 (Figure KR1).

Age and Gender
There has been a slight increase in the proportion of females undergoing knee revisions in recent years. In 2006 the percentage of females being revised was 52.3% (Table KR3).

There has been little change in the age of patients undergoing revision knee surgery with the major age group in 2006 being between 65 and 74 years (32.7%) (Table KR4).

Diagnosis
The most common reason for revision is loosening (37.1%). Other major reasons for revision include; infection (14.6%), tibial wear (7.7%), pain (7.0%), lysis (7.0%) and patello-femoral pain (5.2%). The total number of diagnoses exceeds the total number of procedures. This is because for some procedures there is more than one diagnosis provided. All diagnoses provided have been included in this analysis (Table KR5)

Analysis of first Revisions of known primary procedures

The essential difference between the known primary procedures subgroup of revisions compared to all revision procedures is that because the primary has been recorded by the Registry the revision must have occurred subsequent to this, therefore these revisions are either early or mid term revisions.

Type of revision knee procedures
There are differences in the type of revision in the known primary group when compared to the all revision group.

The proportion of revisions that are major revisions is reduced (63.2% compared to 67.6%). There is also a reduction in the proportion of revisions that are major total revisions (60.8% compared to 70.9%). Other differences include a higher proportion of femoral only major revisions (14.3% compared to 7.4%) and greater use of unicompartmental knee components (6.1% compared to 2.6%) (Table KR6).

There is a higher proportion of minor revisions (36.8% compared to 32.4%). The most common minor revisions are insert only (43.0%) and patellar prosthesis only (40.1%) (Table KR7).

Cement fixation is used far more often than cementless fixation when major components are revised (Table KR6).

Diagnosis
Diagnoses are similar for the known primary and all revisions groups with the exception of a higher incidence of patello-femoral pain (8.2% compared to 5.2%), and pain (11.8% compared to 7.0%). As would be anticipated there are also less revisions for tibial component wear and lysis in the known primary group (Table KR5).

Outcomes Revision Knee Replacement

This analysis examines the risk of subsequent revision following the first revision of a known primary knee replacement. Due to the small number of primary unispacer and patella/trochlear procedures, these procedures have been excluded in this analysis. The analysis has only been performed on the first revision of known primary unicompartmental and primary total knee replacements. In this analysis those first revisions with infection as the reason for the initial revision have been excluded. This is for the same reasons as has been detailed in the

outcomes of first revisions of primary hip procedures.

The outcomes of the first revision of known primary unicompartmental knee replacement (1,167 procedures) and known primary total knee replacement (2,329 procedures) are considered separately.

Outcome of first revisions of primary Unicompartmental knee replacement

The outcome of first revision of primary unicompartmental knees is dependant on the type of first revision undertaken. There are four options for revising a unicompartmental knee replacement. The first three options are unicompartmental to unicompartmental revisions; insert replacement (minor revision), replacement of either the tibial or femoral prosthesis (major partial unicompartmental replacement), replacement of both femoral and tibial unicompartmental prostheses (major total unicompartmental revision). The final option is to convert the unicompartmental knee to a total knee replacement.

Revision to a total knee has a significantly lower rate of re-revision than the three unicompartmental to unicompartmental options. Of these three options replacing both the femoral and tibial prostheses has the lowest re-revision rate and minor revision the highest (Table KR8).

Combining all unicompartmental to unicompartmental revisions into one group they have a revision rate of 10.1 revisions per 100 observed compartment years compared to 3.1 for unicompartmental to total knee. The risk of re-revision of a unicompartmental to unicompartmental revision is 3.2 times greater than a unicompartmental to total knee (hazard ratio (adjusted for age and sex) = 3.19; 95%CI (2.16, 4.71) P<0.0001) (Table KR9 and Figure KR2). The cumulative percent revision at four years is 28.9% for unicompartmental to unicompartmental and 11.2% for unicompartmental to total knee revision (Table KR10).

Although the outcome of revision of a unicompartmental knee to a total knee is better than a unicompartmental to unicompartmental it is important to be aware that the conversion of a unicompartmental knee to a total knee does not give the same outcome as a primary total knee. The risk of re-revision of the unicompartmental knee to total is almost three and a half times greater than a primary total knee (hazard ratio (adjusted for age and sex)=3.4; 95%CI (2.61, 4.42) P<0.0001) (Table KR11 and Figure KR3. The cumulative percent revision of a primary total knee replacement at four years is 2.59% and a conversion of a unicompartmental knee to a total knee is 11.2%) (Table KR12).

Outcome of first revisions of primary total knees

As with unicompartmental knees the outcome of first revisions of primary total knees is dependant on the type of revision undertaken. The re-revision rate for minor revisions is 5.5 per 100 observed component years, major partial 5.3 and major total revisions, 3.8 (Table KR13). These are not significantly different. At three years the cumulative percent revision of a minor revision is 15.6%, a major partial revision is 14.9% and a major total revision is 10.4% (Table KR14 and Figure KR3).

Revision Knee Replacement - 1/9/1999 to 31/12/2006

Prosthesis Fixation and Usage

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	5664	57.2	500	5.0	635	6.4	226	2.3	.	.	7025	70.9
Tibial Only*	1228	12.4	58	0.6	.	.	.	.	.	.	1286	13.0
Femoral Only*	623	6.3	55	0.6	.	.	.	.	.	.	678	6.8
Uni Tibial and Femoral	58	0.6	4	0.0	3	0.0	5	0.1	.	.	70	0.7
Uni Tibial Only*	114	1.2	9	0.1	.	.	1	0.0	.	.	124	1.3
Uni Femoral Only*	57	0.6	2	0.0	.	.	.	.	.	.	59	0.6
Cement Spacer	.	.	.	.	.	.	.	.	510	5.1	510	5.1
Removal of Prostheses	.	.	.	.	.	.	.	.	99	1.0	99	1.0
Fusion Nail	.	.	.	.	.	.	.	.	34	0.3	34	0.3
Reinsertion of Components†	4	0.0	1	0.0	1	0.0	2	0.0	.	.	8	0.1
Patella/Trochlear Resurfacing	.	.	16	0.2	.	.	.	.	.	.	16	0.2
Total	**7748**	**78.2**	**645**	**6.5**	**639**	**6.4**	**234**	**2.4**	**643**	**6.5**	**9909**	**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	1176	24.8
Patella Only	1392	29.3
Insert Only	1889	39.8
Uni Insert Only	157	3.3
Cable/ Other minor components	123	2.6
Removal of patella	8	0.2
Total	**4745**	**100.0**

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

Sex and Age

Table KR3: Usage for Revision Knee Replacement by Sex

Year	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
2002	1141	53.7	983	46.3	2124	100.0
2003	1187	51.6	1115	48.4	2302	100.0
2004	1364	51.9	1266	48.1	2630	100.0
2005	1342	50.1	1339	49.9	2681	100.0
2006	1430	52.3	1303	47.7	2733	100.0

Table KR4: Usage for Revision Knee Replacement by Age

Year	*0-54*		*55-64*		*65-74*		*75-84*		*85+*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
2002	167	7.9	425	20.0	705	33.2	712	33.5	115	5.4	2124	100.0
2003	214	9.3	447	19.4	749	32.5	788	34.2	104	4.5	2302	100.0
2004	272	10.3	585	22.2	881	33.5	786	29.9	106	4.0	2630	100.0
2005	227	8.5	568	21.2	914	34.1	857	32.0	115	4.3	2681	100.0
2006	237	8.7	649	23.7	895	32.7	823	30.1	129	4.7	2733	100.0

Table KR5: Diagnosis - Revision Knee Replacement

Diagnosis	*All Revisions*		*Revisions with known primary*	
	Number	*%*	*Number*	*%*
Loosening	6191	37.1	1695	36.2
Infection	2447	14.6	778	16.6
Wear tibial	1294	7.7	65	1.4
Pain	1171	7.0	552	11.8
Lysis	1170	7.0	81	1.7
Patello femoral pain	863	5.2	384	8.2
Implant breakage tibial	569	3.4	39	0.8
Instability	462	2.8	167	3.6
Progression of disease	462	2.8	215	4.6
Fracture	356	2.1	138	2.9
Arthrofibrosis	260	1.6	137	2.9
Implant breakage patella	229	1.4	28	0.6
Wear patella	183	1.1	22	0.5
Malalignment	162	1.0	85	1.8
Implant breakage femoral	118	0.7	22	0.5
Synovitis	100	0.6	31	0.7
Dislocation	92	0.6	47	1.0
Incorrect sizing	81	0.5	47	1.0
Bearing/dislocation	81	0.5	43	0.9
Patella maltracking	76	0.5	25	0.5
Avascular necrosis	26	0.2	20	0.4
Heterotropic bone	11	0.1	2	0.0
Arthrodesis takedown	4	0.0	2	0.0
Other	301	1.8	60	1.3
Total	**16709**	**100.0**	**4685**	**100.0**

Note: *some patients had multiple diagnoses*

Table KR6: 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	1200	43.1	197	7.1	251	9.0	45	1.6	.	.	1693	60.8
Tibial Only*	339	12.2	17	0.6	.	.	.	.	.	.	356	12.8
Femoral Only*	337	12.1	21	0.8	.	.	.	.	.	.	358	12.9
Uni Tibial and Femoral	31	1.1	3	0.1	2	0.1	2	0.1	.	.	38	1.4
Uni Tibial Only*	84	3.0	6	0.2	.	.	1	0.0	.	.	91	3.3
Uni Femoral Only*	38	1.4	1	0.0	.	.	.	.	.	.	39	1.4
Cement Spacer	.	.	.	.	.	.	.	.	155	5.6	155	5.6
Removal of Prostheses	.	.	.	.	.	.	.	.	40	1.4	40	1.4
Fusion Nail	.	.	.	.	.	.	.	.	3	0.1	3	0.1
Reinsertion of Components†	3	0.1	1	0.0	1	0.0	1	0.0	.	.	6	0.2
Patella/Trochlear Resurfacing	.	.	4	0.1	.	.	.	.	.	.	4	0.1
Total	**2032**	**73.0**	**250**	**9.0**	**254**	**9.1**	**49**	**1.8**	**198**	**7.1**	**2783**	**100.0**

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

Table KR7: Revisions of known primary procedures - Minor Revision Knee Replacement

Components Used	*Number*	*%*
Insert and Patella	234	14.4
Patella Only	649	40.1
Insert Only	696	43.0
Cable/ Other minor components	41	2.5
Total	**1620**	**100.0**

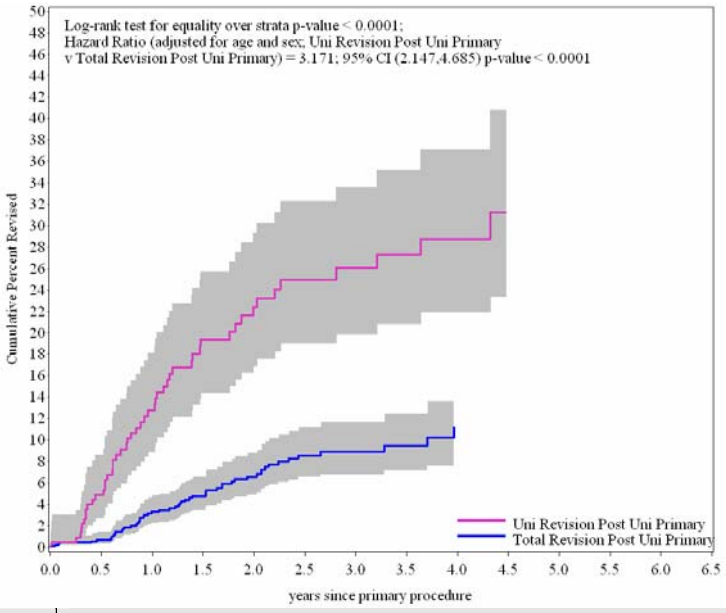
Table KR8: Outcomes of minor, major partial uni, major total uni revisions and total knee revisions of known primary unicompartmental knees (excluding infection as a cause of revision)

Type of revision knee replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Minor	20	92	21.7	182	11.0	(6.72, 17.00)
Major Partial Uni	26	130	20.0	269	9.7	(6.32, 14.17)
Major Total Uni	3	17	17.6	38	7.9	(1.64, 23.22)
To Total Knee	57	932	6.1	1818	3.1	(2.37, 4.06)
Total	**106**	**1171**	**9.1**	**2306**	**4.6**	**(3.76, 5.56)**

Table KR9: Outcomes of Unicompartmental and Total Knee Revisions post Primary Unicompartmental Knees

Procedure	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Prim Uni to Uni Revision	49	239	20.5	488	10.0	(7.42, 13.27)
Prim Uni to Total Revision	57	932	6.1	1818	3.1	(2.37, 4.06)
Total	**106**	**1171**	**9.1**	**2306**	**4.6**	**(3.76, 5.56)**

Figure KR2: Outcome of Unicompartmental Knee Revision post Unicompartmental Primary compared to Total Knee Revision post Unicompartmental Primary



Procedure	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Prim Uni to Uni Revision	239	208	157	119	99	80	63	51	37	23	12	6	3
Prim Uni to Total Revision	932	796	653	524	411	292	210	146	90	44	18	4	1

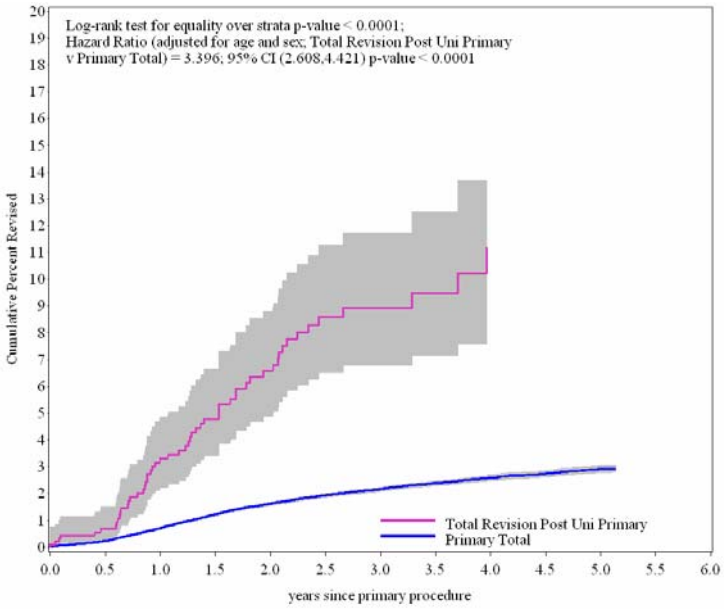
Table KR10: Cumulative Percent Revision of Unicompartmental and Total knee Revisions post Primary Unicompartmental Knees

Procedure	*Cumulative Percent Revised (95% CI)*			
	1 year	*2 years*	*3 years*	*4 years*
Prim Uni to Uni Revision	12.8 (8.92, 18.08)	22.4 (16.93, 29.29)	26.0 (19.91, 33.60)	28.7 (21.95, 37.09)
Prim Uni to Total Revision	3.30 (2.24, 4.86)	6.57 (4.88, 8.81)	8.93 (6.79, 11.71)	

Table KR11: Outcomes of total knee revision of Primary Unicompartmental Knee replacement Compared to outcomes of Total Primary Knee

Procedure	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Prim Uni to Total Knee	57	932	6.1	1818	3.1	(2.37, 4.06)
Primary Total	2359	134087	1.8	354156	0.7	(0.64, 0.69)
Total	**2416**	**135019**	**1.8**	**355974**	**0.7**	**(0.65, 0.71)**

Figure KR3: Outcome of Primary Unicompartmental Knee revised to a Total Knee Compared to the Outcome of Primary Total Knee



Procedure	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Prim Uni to Total	932	796	653	524	411	292	210	146	90	44	18	4	1
Primary Total	134087	119665	105223	91416	77645	65625	54025	43518	32994	23931	15021	8260	3840

Table KR12: Yearly cumulative percentage revision of Total Knee Revision of Primary Unicompartmental Knee replacement compared to outcome of Total Primary Knee

Procedure	*Cumulative Percent Revised (95% CI)*				
	1 year	*2 years*	*3 years*	*4 years*	*5 years*
Prim Uni to Total	3.30 (2.24, 4.86)	6.57 (4.88, 8.81)	8.93 (6.79, 11.71)	11.2 (8.15, 15.24)	
Primary Total	0.71 (0.66, 0.76)	1.63 (1.55, 1.71)	2.17 (2.07, 2.27)	2.59 (2.48, 2.70)	2.92 (2.79, 3.06)

Table KR13: 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	128	1207	10.6	2329	5.5	(4.59, 6.54)
Major Partial	71	673	10.5	1336	5.3	(4.15, 6.70)
Major Total	32	449	7.1	851	3.8	(2.57, 5.31)
Total	**231**	**2329**	**9.9**	**4517**	**5.1**	**(4.48, 5.82)**

Figure KR4: Cumulative percentage revision of minor, major partial, and major total revisions of known primary total knees (excluding infection as a cause of revision)

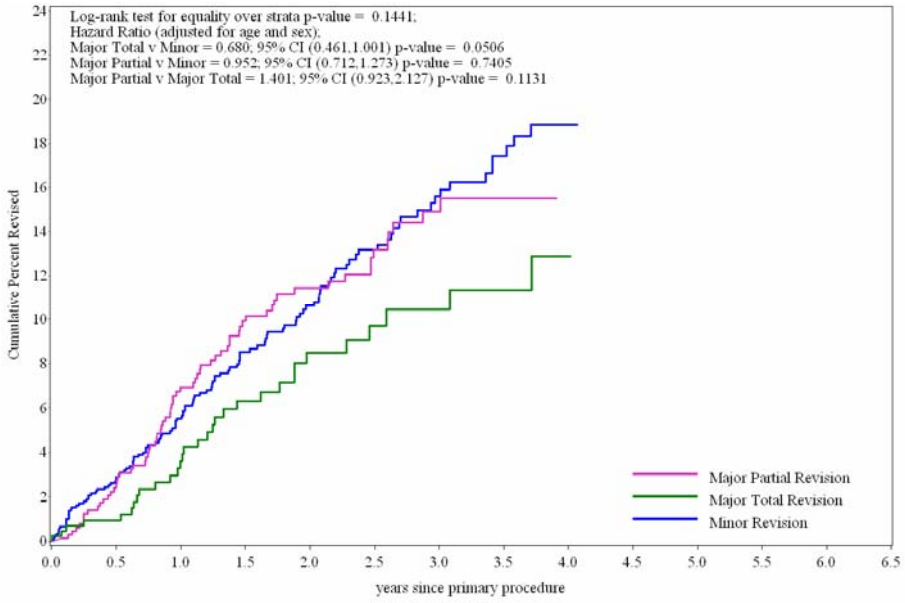


Table KR14: Yearly Cumulative percent revision of minor, major partial, and major total revisions of known primary total knees (excluding infection as a cause of revision)

Type of revision	*Cumulative Percent Revised (95% CI)*			
Knee replacement	*1 year*	*2 years*	*3 years*	*4 years*
Minor	5.5 (4.3, 7.1)	10.6 (8.7, 12.9)	15.6 (13.0, 18.7)	18.8 (15.6, 22.7)
Major Partial	6.9 (5.1, 9.3)	11.4 (9.0, 14.6)	14.9 (11.8, 18.8)	
Major Total	3.6 (2.1, 6.1)	8.5 (5.8, 12.3)	10.4 (7.2, 15.0)	12.9 (8.6, 18.9)

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 2006.

Usage

There continues to be increasing use of antibiotic cement for both primary total hip and knee replacement. During 2006 antibiotic cement was used in 82.3% of primary total hip procedures and 79.2% when cement was used in primary total knee replacement (Figures C1 and C2).

Primary total hip replacement
There are variations in use of antibiotic cement between states and territories for primary total hip replacement. In 2006 this ranged from 90.7% of all cemented procedures in ACT/NT to 74.7% in Victoria (Figure C1).

There has been a major increase in the number of different types of cement used. Cements used for the femoral stem in primary total hip replacement have increased from 38 in 2005 to 48 in 2006. When the acetabular prosthesis is cemented 37 different cements have been used. Again this is a large increase on the 30 used in 2005.

The different cement types used in primary total hip replacement with femoral and acetabular prostheses are detailed in Table C1. The most frequently used cement for femoral stems is Simplex P and for acetabular prostheses it is Simplex Tobra. The later is a change for the last annual report when CMW 1 Plain was the most common cement used with acetabular prostheses. The ten most frequently used cements for femoral stems were used in 93.2% of procedures involving cement fixation of the stem (Table C1). The ten most frequently used cements for acetabular prostheses were used in 96.8% of procedures involving cement fixation of acetabular prostheses (Table C1)

Primary total knee replacement
The use of antibiotic cement in primary total knee replacement also varies by state and territory. In 2006 this ranged from 90.1% of all cemented procedures in Queensland to 53.8% in Tasmania (Figure C2).

The large increase in use of different types of cement during 2006 for primary total hip replacement is also evident in the primary total knee replacement. The number of different types of cement used for femoral prostheses has increased from 36 in 2005 to 47 in 2006, tibial prostheses have increased from 35 to 46 in 2006 and for cements used with the patellar prostheses from 33 in 2005 to 45 in 2006.

The different cement types used in primary knee replacement for the femoral, tibial and patellar prostheses are detailed in Table C2.The most frequently used cement is CMW 1G for all three prostheses (Table C2).

The ten most frequently used cements for femoral prostheses are used in 94.4% of procedures where the femoral component is cemented, 94.4% of procedures when the tibial component is cemented and 94.1% of procedures when the patellar component is cemented (Table C2).

Revision Hip Replacement
When cement is used in revision hip procedures antibiotic cement is used more frequently than in primary total hips (78.9% femoral stems, 82.0% acetabular prostheses).

The most frequently used cement for cemented femoral stem revision is Simplex Tobra and for cemented acetabular revision is CMW 1G (Table C3).

Revision Knee Replacement
As with hip replacement when cement is used in revision knee procedures antibiotic

cement is used more frequently than in primary total knees (81.0% femoral prostheses, 79.1% tibial prostheses and 68.5% patellar prostheses).

As with primary total knee replacement the most frequently used cement for cemented femoral, tibial and patellar prostheses revisions is CMW 1G (Table C4).

Outcomes

The Registry has compared the outcomes of antibiotic and non-antibiotic cement for both primary total hip and primary total 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 (i.e. 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 total 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 component.

Primary total hip replacement

The Registry has compared revision rates for the various combinations of antibiotic and non-antibiotic cement used in primary total hip replacement and found no 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 prostheses to procedures where only non-antibiotic cement was used. Again there is no statistical difference in the rates of revision (Table C6 and 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 (0.4% compared to 0.6% when non-antibiotic cement is used (Table C8). There is also a major difference in revision for loosening and lysis. It is lower when antibiotic cement is used (0.7% compared to non-antibiotic cement, 1.2%) (Table C8). The reason for this is uncertain. These revisions however are early to mid term revisions and it is possible that some revisions for loosening and lysis may be for undiagnosed infection. The form used for Registry notification is most often completed in the operating theatre and inherent in this method of notification is a likely underestimate of the true infection rate.

Further complicating the issue of determining if antibiotic in cement reduces the risk of revision is the possibility of selective use of antibiotic containing cement. It may be used preferentially by surgeons in individuals identified as having an increased infection risk. If it is thought that this is likely, then the trend to a lower revision rate when antibiotic cement is used may be greater than is currently apparent. At this point in time however, the Registry is unable to establish if the use of antibiotics in cement alters 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 = 1.157; 95% CI (1.03, 1.30) P=0.012) (Table C9, Table C10 and table C11and Figure C4).

This reduced revision rate is the result of reduction in revisions occurring for a number of different diagnoses. These include infection (antibiotic is 0.6% and non-antibiotic is 0.8%) and loosening and lysis (antibiotic is 0.5% and non-antibiotic is 0.9%) (Table C12).

Issues previously raised with respect to under notification of infection to the Registry and preferential use of antibiotic cement are also relevant when considering the results of this analysis for primary knee replacement.

Figure C1: Trends in Usage of antibiotic cement in Total Hips by State and Territory

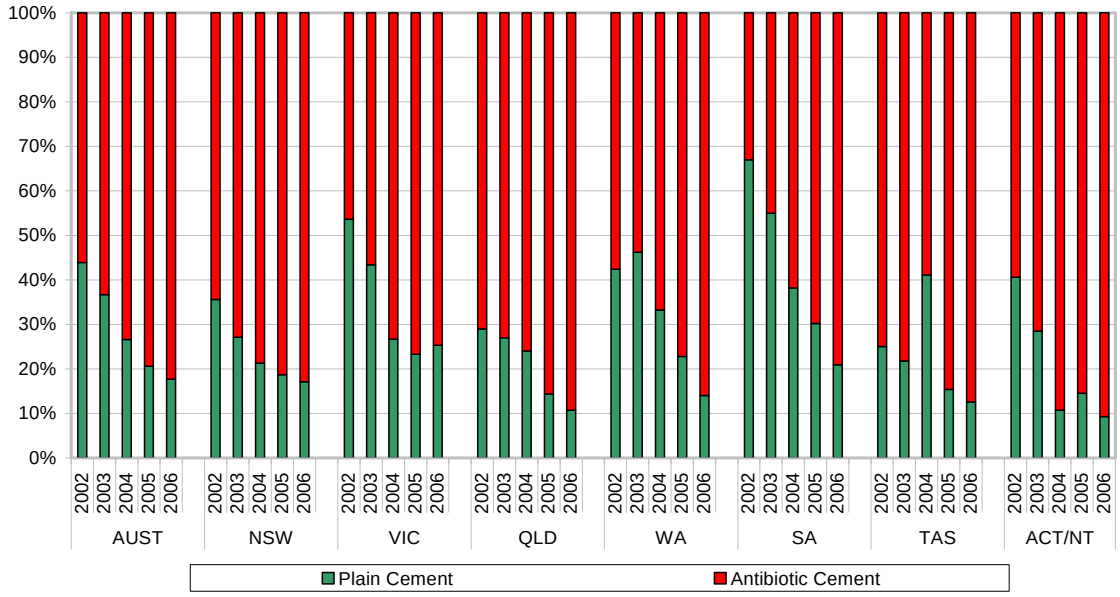


Figure C2: Trends in Usage of antibiotic cement in Total Knees by State and Territory

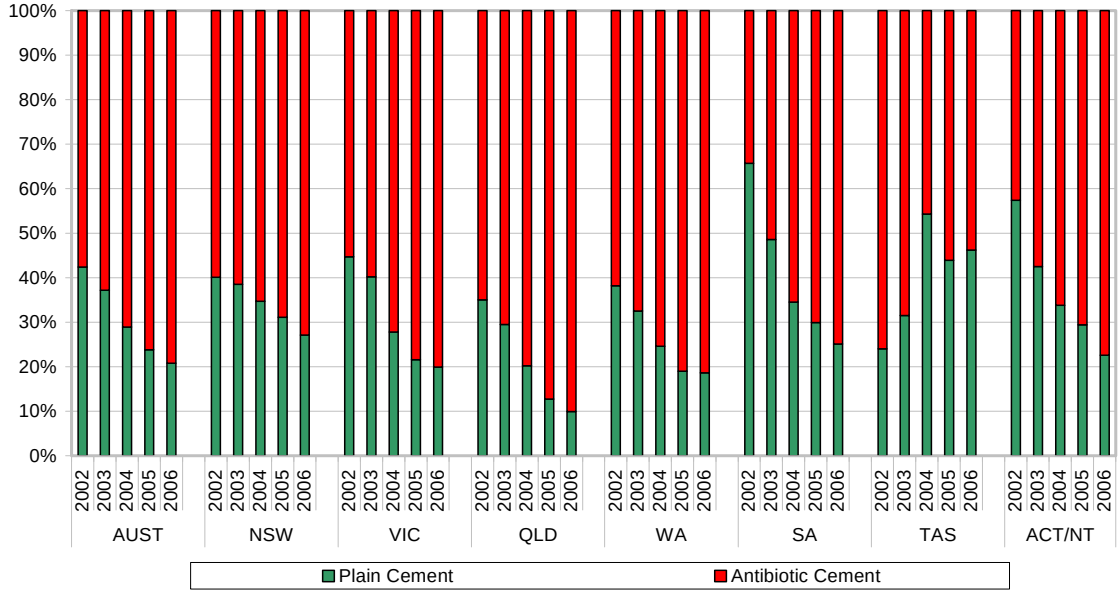


Table C1: Primary Hip Replacement - Top Ten Cements used by Location

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Simplex P	16061	25.3	Simplex Tobra*	2837	19.3
Simplex Tobra*	15108	23.8	CMW 1 Plain	2410	16.4
Antibiotic Simplex*	12232	19.3	Simplex P	2059	14.0
CMW 1 G*	4030	6.3	CMW 1 G*	1696	11.5
CMW 1 Plain	3526	5.6	Palacos R*	1551	10.5
Palacos R*	2896	4.6	Antibiotic Simplex*	1424	9.7
Palamed G*	1728	2.7	CMW 2 G*	931	6.3
CMW 3 G*	1688	2.7	CMW 2 Plain	621	4.2
Palacos E*	1133	1.8	Palamed G*	613	4.2
CMW 3 Plain	757	1.2	CMW 3 G*	94	0.6
Other types (38)	4334	6.8	Other types (27)	467	3.2
Total	**63493**	**100.0**	**Total**	**14703**	**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: Primary Knee Replacement - Top Ten Cements used by Location

Femur	*N*	*%*	*Tibia*	*N*	*%*	*Patella*	*N*	*%*
CMW 1 G*	13951	15.7	CMW 1 G*	18475	15.2	CMW 1 G*	6967	12.8
Simplex Tobra*	9802	11.0	Simplex P	14473	11.9	Antibiotic Simplex*	6828	12.6
Palamed G*	9670	10.9	Simplex Tobra*	13529	11.1	Simplex Tobra*	6392	11.8
Simplex P	9584	10.8	CMW 1 Plain	12459	10.2	Simplex P	5620	10.3
Antibiotic Simplex*	9401	10.6	Antibiotic Simplex*	12409	10.2	CMW 2 Plain	5561	10.2
Palacos R*	9020	10.2	Palamed G*	11199	9.2	Palamed G*	5443	10.0
CMW 1 Plain	8665	9.8	Palacos R*	10778	8.9	Palacos R*	4963	9.1
CMW 2 G*	6547	7.4	CMW 2 Plain	10624	8.7	CMW 1 Plain	4824	8.9
CMW 2 Plain	5588	6.3	CMW 2 G*	9047	7.4	CMW 2 G*	3545	6.5
Palacos R+G*	1575	1.8	Palacos R+G*	1796	1.5	Palacos R+G*	939	1.7
Other types (37)	4998	5.6	Other types (36)	6778	5.6	Other types (35)	3224	5.9
Total	**88801**	**100.0**	**Total**	**121567**	**100.0**	**Total**	**54306**	**100.0**

Note: *more than one type of cement was used in some procedures, * denotes cement with antibiotic*

Table C3: Revision Hip Replacement - Top Ten Cements used by Location

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Simplex Tobra*	1287	30.7	CMW 1 G*	1021	23.6
Antibiotic Simplex*	939	22.4	Simplex Tobra*	775	17.9
Simplex P	492	11.7	Palacos R*	633	14.6
CMW 1 G*	376	9.0	Antibiotic Simplex*	533	12.3
Palacos R*	318	7.6	CMW 1 Plain	304	7.0
Palamed G*	172	4.1	CMW 2 G*	279	6.4
CMW 1 Plain	143	3.4	Palamed G*	273	6.3
CMW 3 G*	102	2.4	Simplex P	212	4.9
Palacos E*	62	1.5	CMW 2 Plain	110	2.5
CMW 2 G*	51	1.2	Palacos R+G*	37	0.9
Other types (27)	252	6.0	Other types (23)	152	3.5
Total	**4194**	**100.0**	**Total**	**4329**	**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 1 G*	1495	20.5	CMW 1 G*	1769	20.9	CMW 1 G*	972	16.0
Palacos R*	993	13.6	Palacos R*	1090	12.9	CMW 2 Plain	854	14.0
Simplex Tobra*	978	13.4	Simplex Tobra*	1090	12.9	CMW 2 G*	744	12.2
Antibiotic Simplex*	887	12.1	Antibiotic Simplex*	969	11.5	Simplex Tobra*	656	10.8
Palamed G*	806	11.0	Palamed G*	878	10.4	Palacos R*	651	10.7
CMW 2 G*	614	8.4	CMW 2 G*	723	8.6	Antibiotic Simplex*	583	9.6
Simplex P	357	4.9	CMW 2 Plain	429	5.1	Palamed G*	468	7.7
CMW 1 Plain	305	4.2	Simplex P	401	4.7	Simplex P	423	6.9
CMW 2 Plain	285	3.9	CMW 1 Plain	398	4.7	CMW 1 Plain	317	5.2
Palacos R+G*	147	2.0	Palacos R+G*	160	1.9	Palacos R+G*	95	1.6
Other types (27)	442	6.0	Other types (29)	537	6.4	Other types (26)	325	5.3
Total	**7309**	**100.0**	**Total**	**8444**	**100.0**	**Total**	**6088**	**100.0**

Note: *more than one type of cement was used in some procedures, * denotes cement with antibiotic*

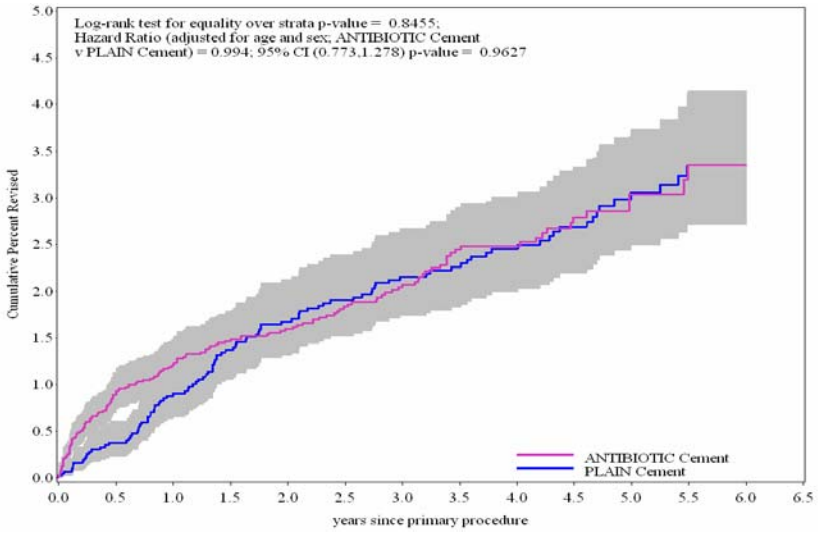
Table C5: Revision Rates for Cemented Primary Total Hips for Osteoarthritis by Cement Type and Location

Antibiotic Status		*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral	*Acetabular*						
Antibiotic	Antibiotic	133	6870	1.9	19454	0.7	(0.57, 0.81)
Antibiotic	Non-Ab	6	210	2.9	649	0.9	(0.34, 2.01)
Non-Ab	Antibiotic	15	612	2.5	1821	0.8	(0.46, 1.36)
Non-Ab	Non-Ab	104	4284	2.4	16640	0.6	(0.51, 0.76)
Total		**258**	**11976**	**2.2**	**38564**	**0.7**	**(0.59, 0.76)**

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)	154	7692	2.0	21924	0.7	(0.60, 0.82)
Non-Ab	104	4284	2.4	16640	0.6	(0.51, 0.76)
Total	**258**	**11976**	**2.2**	**38564**	**0.7**	**(0.59, 0.76)**

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*	*5.5*	*6*
Antibiotic	7692	6935	6280	5624	4933	4178	3500	2833	2209	1602	1049	598	246
Non-Ab	4284	4085	3910	3692	3487	3260	2971	2678	2265	1840	1361	918	467

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*	*5 years*	*6 years*
Antibiotic	1.22 (0.99, 1.50)	1.60 (1.32, 1.92)	2.04 (1.71, 2.43)	2.48 (2.09, 2.94)	3.04 (2.52, 3.66)	3.35 (2.71, 4.14)
Non-Ab	0.90 (0.66, 1.25)	1.67 (1.32, 2.13)	2.16 (1.74, 2.67)	2.45 (1.99, 3.01)	3.05 (2.49, 3.74)	3.34 (2.71, 4.11)

Table C8: Revision Diagnosis for Hips (diagnosis OA) by Cement Status

Diagnosis	*Antibiotic*		*Non-Antibiotic*	
	N	*%*	*N*	*%*
Dislocation of Prosthesis	62	0.8	23	0.5
Fracture	14	0.2	10	0.2
Infection	29	0.4	25	0.6
Loosening/Lysis	52	0.7	50	1.2
Other	5	0.1	4	0.1
Total	**162**	**2.1**	**112**	**2.6**

Note: *some patients had multiple diagnoses*

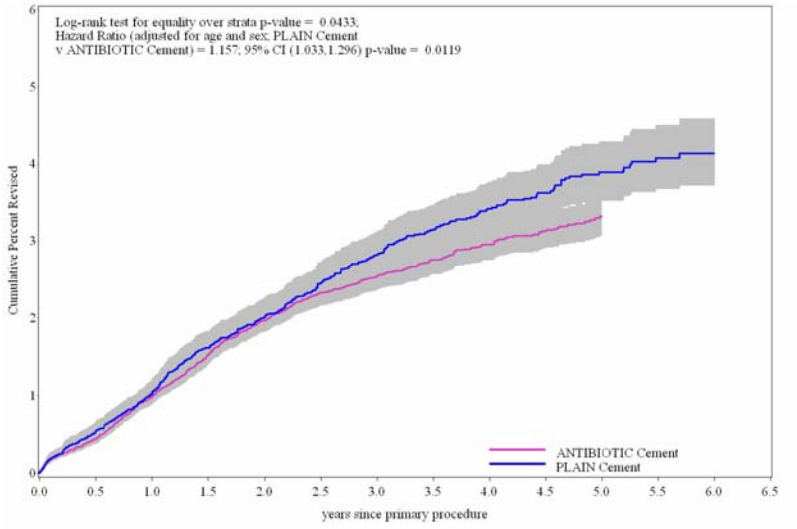
Table C9: Revision Rates for Cemented Primary Total Knees for Osteoarthritis by Cement Type and Location

Antibiotic Status		*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Femoral	*Tibial*						
Antibiotic	Antibiotic	902	46948	1.9	110038	0.8	(0.77, 0.88)
Antibiotic	Non-Ab	6	404	1.5	1200	0.5	(0.18, 1.09)
Non-Ab	Antibiotic	7	215	3.3	581	1.2	(0.48, 2.48)
Non-Ab	Non	452	16367	2.8	53316	0.8	(0.77, 0.93)
Total		**1367**	**63934**	**2.1**	**165134**	**0.8**	**(0.78, 0.87)**

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)	915	47567	1.9	111818	0.8	(0.77, 0.87)
Non-Ab	452	16367	2.8	53316	0.8	(0.77, 0.93)
Total	**1367**	**63934**	**2.1**	**165134**	**0.8**	**(0.78, 0.87)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Antibiotic	47567	41241	35296	29815	24434	19680	15530	12114	9068	6444	3858	1956	847
Non-Ab	16367	15139	13909	12785	11520	10366	9124	7739	6230	4897	3417	2043	963

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*	*5 years*	*6 years*
Antibiotic	0.99 (0.90, 1.09)	1.97 (1.83, 2.12)	2.54 (2.36, 2.72)	2.96 (2.75, 3.18)	3.32 (3.07, 3.59)	
Non-Ab	1.03 (0.89, 1.21)	2.01 (1.79, 2.25)	2.82 (2.54, 3.12)	3.42 (3.10, 3.77)	3.89 (3.53, 4.29)	4.13 (3.73, 4.59)

Table C12: Revision Diagnosis for Knees (diagnosis OA) for Cement Status

Diagnosis	*Antibiotic*		*Non-Antibiotic*	
	N	*%*	*N*	*%*
Fracture	23	0.0	11	0.1
Infection	294	0.6	125	0.8
Loosening/Lysis	253	0.5	150	0.9
Pain	96	0.2	39	0.2
Other	307	0.6	156	1.0
Total	**973**	**2.0**	**481**	**2.9**

Note: *some patients had multiple diagnoses*

Mortality Following Joint Replacement Surgery

Introduction

Mortality information has been obtained by matching all Registry data to December 31st 2006 with the National Death Index (NDI). The NDI is a national mortality database maintained by the Australian Institute of Health and Welfare (AIHW). Access to the database required approval of a formal application to AIHW.

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 the population of 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 2006). 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.

There has been no change over the last year in the trends of death following hip replacement. As would be anticipated, the crude cumulative mortality of primary partial hip procedures is high (43.4%) compared to primary total hips (6.0%). This also reflected in the mortality rate per 100 person years (22.57 primary partial hips and 2.10 primary total hips). This difference is not eliminated after adjusting for age and sex; standardised mortality is 19.3% for partial hips and 2.1% for total hips (SMR = 9). The risk of death for partial hip replacement is five and a half times greater than primary total hips (hazard ratio =5.450; 95%CI (5.247, 5.661) P<0.0001) (Table M1 and Figure M1).

The principal diagnosis for primary partial hips 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. At six years over 75% of patients receiving a monoblock partial hip replacement have died. The number of people who have died at the same time in the other categories are approximately 50% for primary bipolar and unipolar modular hip replacements and 14.5% for primary conventional total hip replacement (Table M4 and Figure M2)

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 (Tables M3, M5 and Figure M3).

There is also a difference in mortality between primary and revision hip procedures. The crude mortality for primary total hips is 6.4% and for revisions, 11.9%. After standardisation for age and gender

there is still a significant difference in the mortality rate for each procedure, 2.4% for primary total hips and 2.9% for revisions (hazard ratio =1.383; 95%CI (1.305, 1.465) P<0.0001) (Tables M1, M3 and M4).

Mortality Associated with Knee Replacement

There has been no change in the trends in mortality following 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.

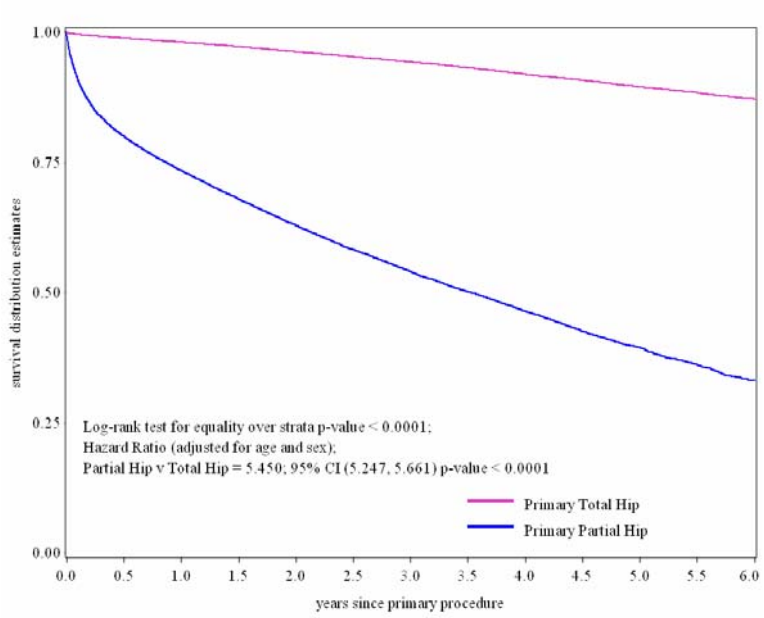
Twelve deaths have been identified during the period of observation for patellar/trochlear procedures. Mortality is less following unicompartmental knee replacement compared to primary total knee replacement. Revision knee replacement has a higher mortality than primary total knee replacement. This trend is still evident after adjustment for age and sex. The risk of death for total knees is 1.4 times greater than unicompartmental knees (hazard ratio = 1.430; 95%CI (1.307, 1.564) P<0.0001) (Table M6 and Figure M4).

Table M1: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2006

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	11175	25739	43.4	19.3328	49510	22.57	(22.15, 22.99)
Primary Total Hip	5834	97926	6.0	2.1182	278195	2.10	(2.04, 2.15)
Revision Hip	1467	12342	11.9	2.8807	37669	3.89	(3.70, 4.10)
Total	**18476**	**136007**	**13.6**	**3.4259**	**365374**	**5.06**	**(4.98, 5.13)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Primary Partial Hip	25739	18850	15631	12916	10581	8438	6656	5068	3756	2517	1607	882	414
Primary Total Hip	97926	88254	79285	70455	61455	52889	44383	36418	28378	20821	13586	7763	3498

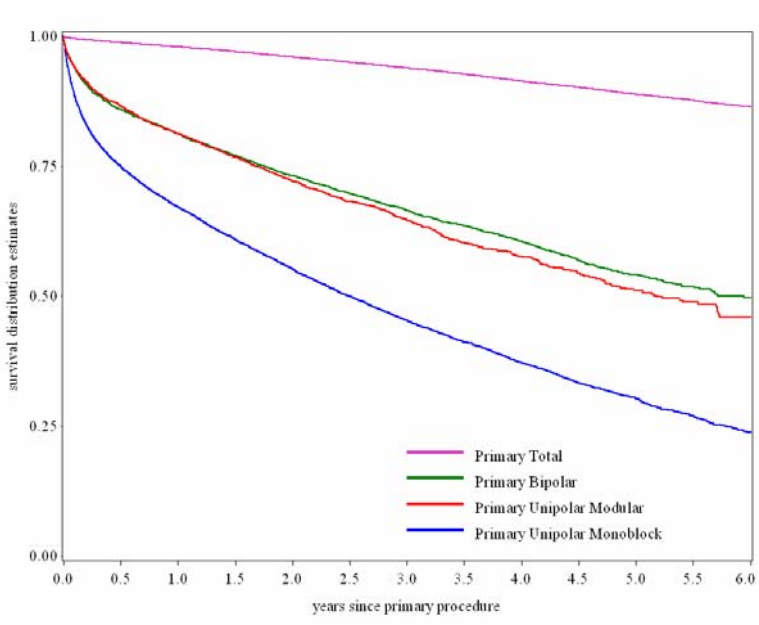
Table M2: Yearly cumulative percent survival of type of hip replacement

Type of hip replacement	*Cumulative Percent Survival (95% CI)*					
	1 year	*2 years*	*3 years*	*4 years*	*5 years*	*6 years*
Partial Hip	73.5 (72.9, 74.0)	63.0 (62.3, 63.6)	54.1 (53.4, 54.8)	46.5 (45.7, 47.3)	39.4 (38.5, 40.4)	33.1 (31.9, 34.3)
Total Hip	98.1 (98.0, 98.2)	96.3 (96.2, 96.4)	94.3 (94.1, 94.5)	92.0 (91.7, 92.2)	89.5 (89.2, 89.8)	87.2 (86.7, 87.6)

Table M3: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2006 (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	2214	6829	32.4	24.8011	15237	14.53	(13.93, 15.15)
Primary Unipolar Mono	7627	13996	54.5	14.4892	26222	29.09	(28.44, 29.75)
Austin-Moore Type	5922	10391	57.0	15.3323	19834	29.86	(29.10, 30.63)
ETS	64	326	19.6	7.2180	271	23.64	(18.21, 30.19)
Thompson Type	1641	3279	50.0	13.6872	6118	26.82	(25.54, 28.15)
Primary Unipolar Modular	1334	4914	27.1	10.3532	8051	16.57	(15.69, 17.48)
Primary Resurfacing	64	7791	0.8	0.5690	20847	0.31	(0.24, 0.39)
Primary Thrust Plate	2	124	1.6	0.5685	451	0.44	(0.05, 1.60)
Primary Total	5768	90011	6.4	2.3598	256898	2.25	(2.19, 2.30)
Revision	1467	12342	11.9	2.8807	37669	3.89	(3.70, 4.10)
Total	**18476**	**136007**	**13.6**	**3.4259**	**365374**	**5.06**	**(4.98, 5.13)**

Figure M2: Kaplan-Meier Survival - following Hip Procedure including Types of Partials

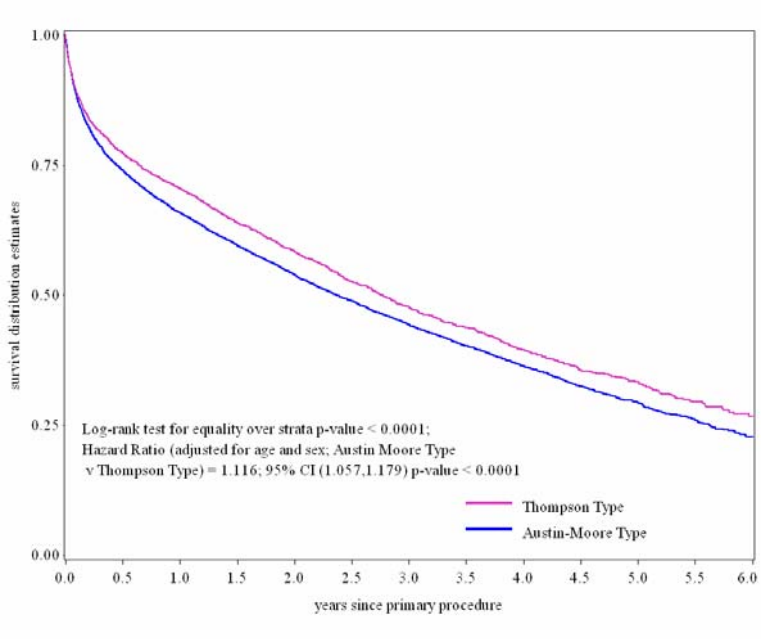


Type of hip replacement	*Number at risk at start of the period*												
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Primary Bipolar	6829	5461	4716	3993	3377	2768	2226	1724	1262	805	482	260	139
Primary Unipolar Mono	13996	9878	8206	6871	5606	4450	3496	2689	2026	1380	903	493	214
Primary Unipolar Mod	4914	3511	2709	2052	1598	1220	934	655	468	332	222	129	61
Primary Total Hip	90011	81108	72877	64814	56600	48787	40991	33714	26341	19475	12841	7432	3395

Table M4: Yearly cumulative 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*	*6 years*
Prim Bipolar	81.2 (80.2, 82.1)	73.2 (72.0, 74.3)	66.5 (65.2, 67.7)	60.5 (59.1, 62.0)	54.2 (52.4, 56.0)	49.6 (47.2, 52.0)
P Unipolar Mono	67.2 (66.4, 68.0)	55.3 (54.4, 56.2)	45.3 (44.4, 46.3)	37.3 (36.3, 38.3)	30.3 (29.2, 31.4)	23.8 (22.4, 25.2)
P Unipolar Mod	81.3 (80.1, 82.4)	72.2 (70.7, 73.7)	64.7 (62.9, 66.5)	57.7 (55.4, 59.8)	51.1 (48.3, 53.8)	46.0 (42.3, 49.6)
Prim Total Hip	98.0 (97.9, 98.1)	96.0 (95.9, 96.2)	93.9 (93.7, 94.1)	91.4 (91.2, 91.6)	88.8 (88.5, 89.2)	86.5 (86.0, 86.9)
Revision Hip	95.8 (95.5, 96.2)	92.9 (92.4, 93.4)	89.5 (88.9, 90.1)	86.4 (85.6, 87.1)	81.9 (80.9, 82.8)	78.3 (76.9, 79.6)

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Austin-Moore Type	10391	7318	6136	5200	4288	3446	2714	2092	1572	1059	677	366	148
Thompson Type	3279	2367	1951	1605	1290	1001	782	597	454	321	226	127	66

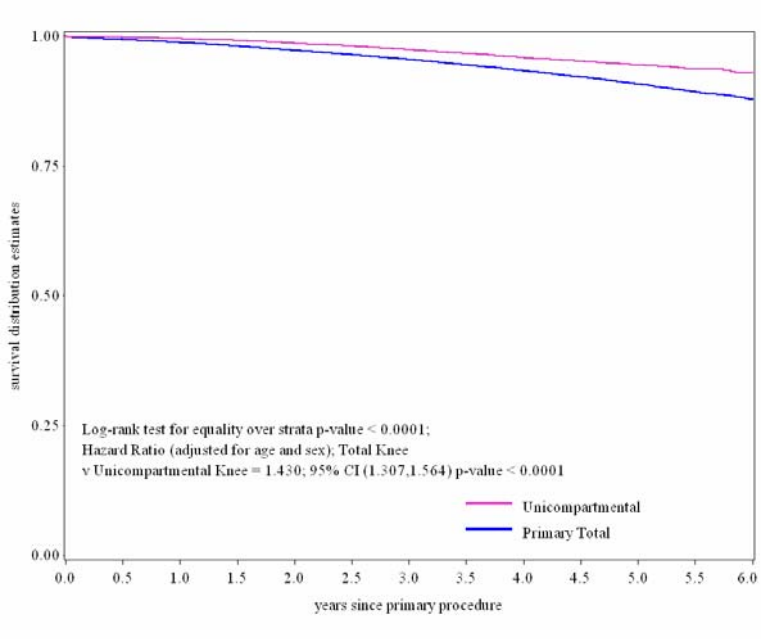
Table M5: Yearly cumulative percent survival of type of hip replacement

Type of hip replacement	*Cumulative Percent Survival (95% CI)*					
	1 year	*2 years*	*3 years*	*4 years*	*5 years*	*6 years*
Austin-Moore	65.8 (64.9, 66.8)	54.0 (53.0, 55.0)	44.3 (43.3, 45.4)	36.4 (35.3, 37.5)	29.3 (28.1, 30.5)	22.7 (21.2, 24.3)
Thompson Type	70.5 (68.9, 72.1)	58.4 (56.5, 60.2)	47.8 (45.8, 49.8)	39.5 (37.3, 41.6)	33.2 (30.9, 35.6)	26.8 (23.9, 29.7)

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	12	678	1.8	0.71192	1802	0.67	(0.34, 1.16)
Unicompartmental	532	18331	2.9	0.90695	54569	0.97	(0.89, 1.06)
Primary Total	5229	108784	4.8	8.13371	303358	1.72	(1.68, 1.77)
Revision	671	7348	9.1	2.47162	24115	2.78	(2.58, 3.00)
Total	**6444**	**135141**	**4.8**	**7.70672**	**383843**	**1.68**	**(1.64, 1.72)**

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*	*3.5*	*4*	*4.5*	*5*	*5.5*	*6*
Patella/trochlear	678	618	551	473	414	336	274	212	153	102	74	43	20
Unicompartmental	18331	16919	15421	13897	12276	10745	9161	7471	5746	4063	2529	1274	550
Primary Total	108784	98022	87349	77173	66634	57255	47847	39217	30209	22271	14209	7931	3709

Table M7: Yearly cumulative 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*	*6years*
Uni	99.5 (99.4, 99.6)	98.6 (98.4, 98.8)	97.4 (97.1, 97.7)	95.9 (95.5, 96.3)	94.5 (94.0, 95.0)	93.1 (92.2, 93.9)
Total Knee	98.8 (98.7, 98.9)	97.3 (97.2, 97.4)	95.5 (95.4, 95.7)	93.4 (93.2, 93.6)	90.8 (90.5, 91.1)	87.8 (87.4, 88.3)

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.)

Observed Component Years: The cumulative number of years that a procedure is at risk of being revised. This is calculated for each procedure as the number of days from the date of the primary procedure until either the date of revision, date of death or end of study (31/12/2006) whichever happens first. This is then divided by 365.25 to get the number of 'component years'. Each primary procedure then contributes this calculated number of component years to the overall observed component years for a particular category.

For example

1. A primary total hip procedure performed on 1/1/2006 was revised on 1/7/2006. Therefore, the number of days that this procedure is at risk of being revised is 183 days. This patient then contributes 0.5 (183/365.25) component years to the overall number of **observed component years** for the total hip procedure category.

2. A patient with a primary procedure on 1/1/2006 died without being revised on 1/4/2006. This individual has 0.25 component years.

3. A primary procedure on 1/1/2006 and has not been revised. This individual has 1 component year (as observation time is censored at 31/12/2006).

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 & 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, Mr David Davidson
- Deputy Director, Mr Richard de Steiger
- Coordinators
  Ms Lisa Ingerson, Ms Ann Tomkins
- Assistant Coordinator
  Ms Adriana Parrella
- Data Management & 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 who may be affected. To do this it is important to record information on every person having a joint replacement. Approximately 65,000 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 joint 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 Ann Tomkins, 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. Ann Tomkins.

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

Primary Hip

Partial Hip Replacement

49315-00 Partial arthroplasty (excludes Austin Moore)
47522-00 Austin Moore

Primary Total Hip Replacement

49318-00 Total arthroplasty of hip unilateral
49319-00 Total arthroplasty of hip bilateral
90607-00 [1489] Resurfacing of hip, unilateral
90607-01 [1489] Resurfacing 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

Primary Total Knee

Patellofemoral Replacement

49534-00 Total replacement arthroplasty of patellofemoral joint of knee

Unicompartmental Knee

49517-00 Hemi arthroplasty of knee

Primary Total Knee

49518-00 Total arthroplasty of knee unilateral
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

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

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