AUSTRALIAN ORTHOPAEDIC ASSOCIATION

NATIONAL JOINT REPLACEMENT REGISTRY

Annual Report

2005

AUSTRALIAN ORTHOPAEDIC ASSOCIATION
NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT

Prepared by

Professor Stephen Graves
Director

Mr David Davidson
Chairman

Ms Lisa Ingerson
Coordinator

Associate Professor Philip Ryan
Ms Liddy Griffith
Mr Brian McDermott
Ms Nicole Pratt
Data Management and Analysis Centre
University of Adelaide

REGISTRY COMMITTEE

David Davidson	Chairman, South Australia
Stephen Graves	Director
John Batten	Tasmania
Warwick Bruce	New South Wales
Hugh English	Queensland
Richard de Steiger	Victoria
Phillip Auburn	Australian Capital Territory
Richard Beaver	Western Australia
James Bodel	Honorary Treasurer

The Registry is funded by a grant from the Commonwealth Government

Director Professor Stephen Graves

Contact details - Department of Public Health
UNIVERSITY OF ADELAIDE SA 5005

Telephone: 08 8303 3592
Facsimile: 08 8223 4075
Email: segraves@unimelb.edu.au

Coordinator Lisa Ingerson

Contact details - Department of Public Health
UNIVERSITY OF ADELAIDE SA 5005

Telephone: 08 8303 3592
Facsimile: 08 8223 4075
Email: lisa.ingerson@adelaide.edu.au

The AOA National Joint Replacement Registry Web site can be accessed at www.aoa.org.au/ via *Related Links* or www.dmac.adelaide.edu.au/aoanjrr/

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NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT
2005

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SOUTH AUSTRALIA

Public Hospitals

Clare District Hospital
Janeece Madigan, CN Theatre
Flinders Medical Centre
Jo Drabsch, CN Theatre
Lyell McEwin Hospital
Julie Tyreman, RN Theatre
Modbury Public Hospital
Jan Caufield, CN Orthopaedic Theatre
Mt Barker District Soldiers Memorial Hospital
Emma Crowder, RN Theatre
Mt Gambier Regional Hospital
Kay Main, RN Theatre
Murray Bridge Soldiers Memorial Hospital
Chris Jarvis, CN Theatre
Naracoorte Health Service
Margie Sinclair, CN Theatre
Noarlunga Hospital
Carole Dawson, RN Theatre
Port Augusta Hospital
Minnie Reynolds, NUM Theatre
Port Lincoln Hospital
Chris Weber, NUM Theatre
Port Pirie Hospital
Frances Reynolds, Clinical NUM Theatre
Queen Elizabeth Hospital
Carol Saniotis, NUM Theatre
Repatriation General Hospital
Marie Irvine, CN Theatre
Riverland Regional Hospital
Leanne Zerna, RN Theatre
Royal Adelaide Hospital
Lisa Carter, CN Orthopaedic Theatre
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
Paul Mitchell, CN Theatre
Blackwood Hospital
Dani McKenna, Clinical Manager Theatre
Burnside War Memorial Hospital
Meriel Wilson, Manager Medical Records
Calvary Hospital Adelaide Inc
Adele Alves, CN Orthopaedic Theatre

SOUTH AUSTRALIA continued

Private Hospitals

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

AUSTRALIAN CAPITAL TERRITORY

Private Hospitals

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

Public Hospitals

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

Public & Private Hospitals

Calvary Health Care
Tina Forshaw, CN Theatre

NORTHERN TERRITORY

Public Hospitals

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

Private Hospitals

Darwin Private Hospital
Nicholas Lucas, RN Pre-admission Clinic

Participating Hospitals & Coordinators – continued

WESTERN AUSTRALIA

Public Hospitals

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

Private Hospitals

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

TASMANIA

Public Hospitals

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

TASMANIA

Private Hospitals

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

QUEENSLAND

Public Hospitals

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

Participating Hospitals & Coordinators – continued

QUEENSLAND continued

Private Hospitals

Allamanda Private Hospital
Maragaret Law, NUM theatre
Brisbane Private Hospital
Liz Drabble, Operational Manager
Caboolture Hospital
Sue Adams, NUM Theatre
Craig Gater, CNC Theatre
Cairns Private Hospital
Pat Warburton, RN Theatre
Caloundra Private Hospital
Christine Wells, CN Theatre
Friendly Society's Hospital
Anne Whalley, Theatre Receptionist
Gold Coast Hospital, Robina Campus
Moira Briggs, NUM Perioperative Services
Melissa Waters, CN Theatre
Greenslopes Private Hospital
Jodie Tompkins RN, Lisa Yang, RN Theatre
Hillcrest Rockhampton Private Hospital
Lyn Martin, NUM Theatre
Holy Spirit Northside Hospital
Molly Harmer, CNC Orthopaedic Theatre
John Flynn Hospital
Paula Archer, CN Orthopaedic Theatre
Mater Misericordiae Hospital Bundaberg
Judy Tucker, CNS Orthopaedic Theatre
Mater Misericordiae Hospital Mackay
Karen Bedford, CNC Theatre
Mater Misericordiae Hospital Rockhampton
Lorelei Thomas, RN Theatre
Mater Misericordiae Hospital Townsville
Regina Hansen, CN Theatre
Mater Misericordiae Private Hospital
Ann Hayward, RN Theatre,
Chris Tyrrell, RN Theatre
Mater Private Hospital Redland
Erina Harris, RN Theatre
Nambour Private Hospital
Yvonne Hemingway, RN Theatre
Noosa Hospital
Janet McMeekin, RN Theatre
North West Private Hospital
Lyndal Schnitzerling, Clinical Coordinator Theatre
Peninsula Private Hospital
Janene Stewart, NUM Theatre
Samantha Carney, CN Theatre
Pindara Private Hospital
Carli Hogan, RN Perioperative Unit
Pioneer Valley Hospital
Pam Barrett, Theatre Services Coordinator
St Andrew's Private Hospital
Brenda Stephens, Theatre Reception
St Andrew's Hospital, Toowoomba
Judith Knight, Manager Perioperative Services
St Andrew's War Memorial Hospital
Nicole Nash-Arnold, Theatre Coordinator

QUEENSLAND continued

Private Hospitals

St Stephen's Private Hospital
Sheila Jensen, RN Theatre
St Vincent's Hospital
Judy Plotecki, RN Perioperative Services
Sunnybank Private Hospital
Dianne Cossor, Theatre Inventory Control Officer
The Sunshine Coast Private Hospital
Sheree Bailey RN Theatre,
Chantalle Harrison, RN Theatre
The Wesley Park Haven Private Hospital
Karryn Lytton NUM Theatre
Wesley Hospital
Carolyn Wilson, CNM Ward 2M

VICTORIA

Public Hospitals

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

Participating Hospitals & Coordinators – continued

VICTORIA continued

Public Hospitals

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

Private Hospitals

Beleura Private Hospital
Jean Leyland, RN Theatre
Bellbird Private Hospital
Vanessa Keane, Orthopaedic Case Manager
Cabrini Health, Malvern
Deborah Fleckner, Assistant Hospital Project Manager
Cotham Private Hospital
Susan Leech, RN Orthopaedic Theatre
Epworth Hospital
Tilak Weerakkody, RN Theatre
Ronelle Kok, RN Theatre
Essendon Private Hospital
Chan Leong, NUM Theatre
Freemasons Hospital
Claudia Nozzolillo, CNS Orthopaedic Theatre
Geelong Private Hospital
Andrew Zygmunt, ANUM Orthopaedic Theatre
John Fawkner Hospital
Jenny Collins, ANUM Orthopaedic Theatre
Knox Private Hospital
Sally Thomas, Orthopaedic Liaison Nurse
Latrobe Private Hospital
Jenny Telfer, NUM, Charm D'Cruz, RN Theatre

VICTORIA continued

Private Hospitals

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

Participating Hospitals & Coordinators – continued

NEW SOUTH WALES

Public Hospitals

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

NEW SOUTH WALES continued

Public Hospitals

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

Participating Hospitals & Coordinators – continued

NEW SOUTH WALES continued

Private Hospitals

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

NEW SOUTH WALES continued

Private Hospitals

Port Macquarie Private Hospital
Susie Storm, CNS Orthopaedic Theatre
Shellharbour Private Hospital
Liz Quennel, Medical Records
Southern Highlands Private Hospital
Karen Cooper, NUM Theatre
St George Private and Medical Centre
Richard Ibarra, NUM Theatre
St Luke's Hospital
Pauline Morely, NUM Theatre
Virginia Johnston, A/NUM Theatre
St Vincent's Private Hospital Bathurst
Teresa Luczac, RN Theatre
St Vincent's Private Hospital Darlinghurst
Astiness Kalach, Health Information Manager
St Vincent's Private Hospital Lismore
Fay Widdows, RN Care Coordinator Orthopaedics
Strathfield Private Hospital
Donna Reichel, Perioperative Manager
Sydney Adventist Private Hospital
Bronwyn Stewart, CNS Theatre
Sydney Private Hospital
Jeremy Moles, NUM Theatre
Sydney Southwest Private Hospital
Margaret Flavelle, Orthopaedic Case Manager
Tamara Private Hospital
Lisa Wallet, CNS Orthopaedic Theatre
The Hills Private Hospital
Julie Guthrie, Clinical Orthopaedic Coordinator
The Mater Hospital
Toni Cummins, RN Theatre
The Prince of Wales Private Hospital
Amanda Linsley, Specialty Team Leader Orthopaedics
Toronto Private Hospital
Sonia McElhinney, Executive Assistant
Warners Bay Private Hospital
Annette Harrison, CNS Theatre
Westmead Private Hospital
Alex Salanga, CNS Orthopaedic Theatre
Westside Private Hospital
Ruth Wigley, NUM 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*
Gawler Health Services	*SA*
Logan Private Hospital	*QLD*
Mosman Private Hospital	*NSW*
Repatriation Hospital, Heidelberg	*VIC*
Galliers Private Hospital	*WA*

INTRODUCTION

This is the sixth annual report of the Australian Orthopaedic Association National Joint Replacement Registry (AOA NJRR). This Report is based on the analysis of 207,675 hip and knee procedures undertaken in 162,628 patients with a procedure data on or before the 31st December 2004.

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

BACKGROUND TO THE REGISTRY

Joint replacement is a commonly performed major procedure that has considerable success in alleviating pain and disability. The rate of joint replacement surgery is increasing rapidly and will continue to do so. For the last ten years there has been an average annual increase of just over 7% each year. Government figures detailed in this Report indicate that almost 60,000 hip and knee replacements were performed during the financial year 2003-2004. This compares to 32,000 procedures in 1993-1994. Knee replacement procedures have increased at over twice the rate of hip replacements during this period. The Registry has estimated that expenditure for acute care alone is now approaching $ 1 billion (Australian) per annum.

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

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

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

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

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

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

AIMS OF THE REGISTRY

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

REGISTRY MANAGEMENT

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

DATA COLLECTION METHOD

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

DATA VALIDATION

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

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

Currently the Registry receives information from hospitals on more procedures than are provided by the state health departments. For the period of matching for this report the Registry received 11,190 (11.8%) more forms than

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

On the initial pass of this validation process, 90% of records were an exact match and 3% were partial matches. Note that these percentages do not reflect the capture rate of procedures, but rather the provision of data to the Registry and the adequacy of matching data from several sources in the absence of an industry standard. Subsequent errors in "matching" are managed depending on the nature of the error. Errors within the health department files may have been identified on procedure code, for example a procedure within a specific hospital may be identified as ICD-10-AM code 49318-00 (a primary hip code), and the Registry has received a form for a Primary Knee procedure performed in that hospital on a patient with that unit record number within the specified admission time. Other errors may only be resolved by contacting the original treating hospital, for example, clarification of primary or revision codes or admission times. The validation process also identifies procedures that have not been notified to the Registry. Sufficient information is supplied in the state unit record data (patient unit record number and admission period) to enable the Registry to request procedure details from individual hospitals for these unreported records.

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

ASSESSING PROSTHESIS PERFORMANCE

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

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

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

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

either

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

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

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

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

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

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

Survival Analysis

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

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

COMPANY RESPONSES TO REGISTRY ANALYSES

When specific prostheses are identified as having a higher revision rate compared to other prostheses in their class, this information has been provided to the relevant companies for comment. When available these comments have been published in the report.

It is important to emphasis that these are the views of the company. In no way do they reflect the views of the Registry. They have been published to provide additional information on the company's perspective and importantly the actions that the company has or is going to undertake with respect to the information. The Registry has not made any comments on the responses from the companies. The assessment of the appropriateness of the comments is for the reader to assess.

WHAT IS NEW IN 2005

This year there have been some major changes to the format of the Annual Report. Trends for type of surgery undertaken, prosthesis usage and fixation are being reported for the first time. National as well as state and territory comparisons are provided.

The Report contains an increased number of analyses comparing performance of different classes of prostheses. When there has been no change in analysis previously reported, then the Registry has not necessarily included that analysis in this report.

Resurfacing hips have been treated as a separate group rather than being included in primary total hip replacement as has been done in previous years.

This year the Registry is reporting on an increased number of specific prostheses that have a higher than anticipated revision rate. These reports will be found in the hip and knee sections.

ACKNOWLEDGEMENTS

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

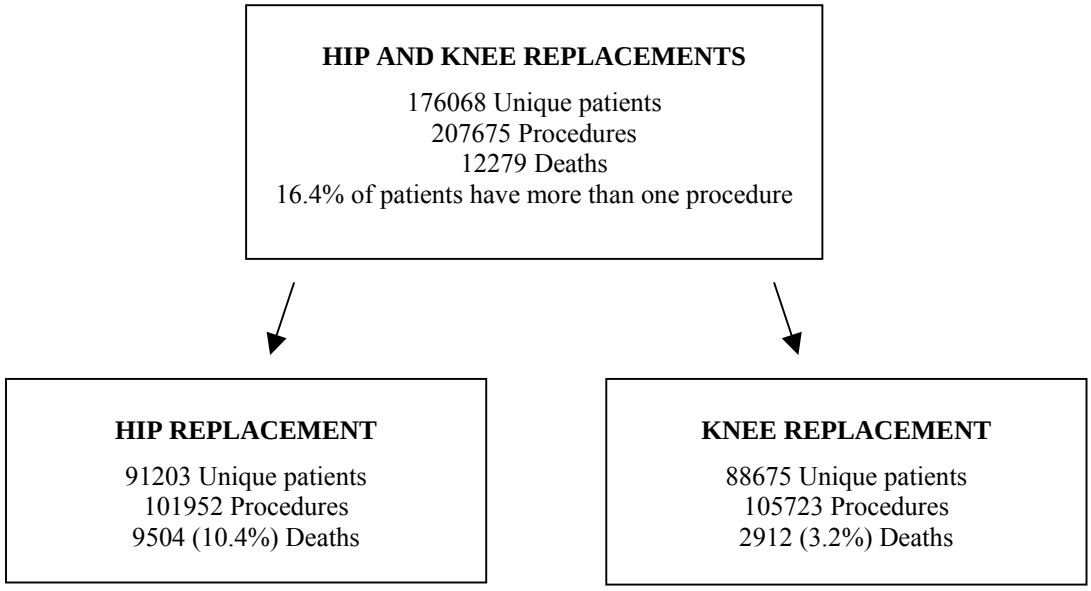
Implementation of National Joint Replacement Registry

Table NJRR1: Dates of implementation by state and territory

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

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

Chart of patients and procedures recorded by the Registry to December 2004



GOVERNMENT JOINT REPLACEMENT DATA 1994 - 1995 to 2003 - 2004

Introduction

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

Data Collection Method

Data were obtained for specific ICD-10-AM codes relating to hip and knee joint replacement from the state and territory health departments. Data were for all public and private hospitals that undertake joint replacement from the 1st July 1994 to 30th June 2004. Due to the relatively small number of procedures undertaken in the Australian Capital Territory (ACT) and Northern Territory (NT), it is necessary to combine the figures to ensure anonymity. These data have not been age or sex adjusted.

General Comments

The total number of hip and knee replacement procedures for the twelve-month period from the 1st July 2003 to the 30th June 2004 increased by 5.8% to 59,064 (Table G1 & G2). Tasmania was the only state to record a decrease in the numbers of hip and knee procedures undertaken for the year (Table G3 and Figure G1)

Data for the last 10 years demonstrate that hip and knee joint replacement surgery has increased by 84.5%. Hip replacement procedures increased by 56.5% and knee replacement by 123.6% (Table G4 and Figure G2). Table G5 details the percentage change of the different types of hip and knee replacement by state and territory. ACT/NT had the largest increase in both hip and knee replacement (111.7%, 313.1%) but of the states Queensland had the largest increase (87.2% and 139.3%).

Incidence per 100,000

The incidence of all joint replacement procedures for the 2003-2004 year increased to 293.7 per 100,000. The incidence per 100,000 for the different types of hip and knee replacement is shown in Table G6.

Knee replacement procedures (148.7 per 100,000) overall have a greater incidence than hip replacement (145.0 per 100,000) (Table G6). The total incidence for hip replacement however includes partial hip replacement. Knee replacement procedures are almost always undertaken for degenerative conditions such as osteoarthritis. It is known that partial hips are usually undertaken for fracture neck of femur. Excluding the partial hip replacement figures the incidence of hip replacement becomes 115.8 per 100,000. This is a more accurate reflection of the incidence of hip replacement for degenerative conditions and highlights a significant difference between the rates of hip and knee replacement

South Australia had the highest incidence for both hip (174.7 per 100,000) and knee replacement (176.0 per 100,000) for the 2003-2004 year (Table G6).

Hip Replacement

The total number of hip replacements performed for the financial year 2003-2004 was 29,165. This is an increase of 4.8% when compared to the 2002-2003 year (Table G2).

The proportions of type of replacement are similar to the previous year and are presented in Table G1. Partial hip replacement varied from 18.0% in the Australian Capital Territory/Northern Territory group to 23.3% in South Australia and primary total hip replacement ranged from 64.2% in Queensland to 70.1% in Tasmania (Table G1). Revision hip

replacement increased more than primary partial and total hip replacement (7.4% compared to 3.9% and 4.6%) (Table G2).

The proportion of hip replacement procedures that were revisions increased from 13.1% to 13.4% (Table G1 and Figure G4). It is important to emphasize this is not the revision rate but is the proportion of hip replacement procedures that are revisions. It is not possible to determine from the health department data which types of hip replacements (partial, primary or revision) have been revised.

Knee Replacement.

The total number of knee replacements recorded by the state governments for the financial year 2003-2004 was 29,899. This is an increase of 6.8% compared to the previous financial year.

The overall proportion of both patellar/trochlear (1.0%) and unicompartmental knee replacements (11.8%) were lower than the previous year (1.1% and 12.7%). The proportion of knee replacements that were primary total and revision knee replacement was similar (Table G2). The absolute number of patella/trochlear and unicompartmental knee replacements also decreased compared to the previous year (-1.3% and -0.9%) (Table G2).

The proportion of knee replacements that were revision procedures in 2003-2004 decreased from 9.3% to 8.7% (Table G1). South Australia had the highest percentage of knee revisions (9.9%) (Table G1 and Figure G5). As is the case with hip replacement it is not possible to determine from government data, what type of knee replacements were revised.

Private and Public

There has been an increase in both public and private hip and knee replacement during the 2003-2004 financial year. The increase was marginally higher in the public system (5.8% and 5.7%) (Table G8 and Figure G6).

Hip replacement increased by 4.8% (4.9% public, 4.7% private) (Table G9, Figure G7). There was a greater increase in knee replacement (6.8%) (7.1% public, 6.6% private) (Table G10 and Figure G8).

The number of hip and knee procedures performed in both public and private for the individual state and territories for the financial years 1997-1998 to 2003-2004 is shown in Figures G9 to G15.

Hip and Knee Replacement

Table G1: Number *(percent)* of Hip & Knee Replacements Nationally 1/7/2003 - 30/6/2004

Type of joint replacement	*NSW*	*VIC*	*QLD*	*WA*	*SA*	*TAS*	*ACT/NT*	*Aust. total*
Hip replacement								
Partial	1,765	1,582	1,065	558	626	148	134	5,878
	19.2	*19.6*	*22.0*	*19.7*	*23.3*	*18.2*	*18.0*	*20.2*
Primary total	6,149	5,450	3,107	1891	1719	569	495	19,380
	66.9	*67.6*	*64.2*	*66.8*	*64.1*	*70.1*	*66.6*	*66.4*
Revision	1,284	1,033	664	381	336	95	114	3,907
	14.0	*12.8*	*13.7*	*13.5*	*12.5*	*11.7*	*15.3*	*13.4*
Total	**9,198**	**8,065**	**4,836**	**2,830**	**2681**	**812**	**743**	**29,165**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Knee replacement								
Patellar/trochlear	144	45	37	18	42	2	11	299
	1.3	*0.7*	*0.6*	*0.6*	*1.6*	*0.3*	*1.3*	*1.0*
Unicompartmental	1,800	674	253	200	459	59	80	3,525
	16.5	*10.8*	*4.4*	*7.0*	*17.0*	*9.0*	*9.7*	*11.8*
Primary total	8,079	4,934	4,945	2385	1932	531	657	23,463
	74.0	*79.3*	*86.2*	*83.6*	*71.5*	*81.3*	*79.9*	*78.5*
Revision	888	569	503	249	268	61	74	2,612
	8.1	*9.1*	*8.8*	*8.7*	*9.9*	*9.3*	*9.0*	*8.7*
Total	**10,911**	**6,222**	**5,738**	**2,852**	**2,701**	**653**	**822**	**29,899**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Hip & KneeTotal	**20,109**	**14,287**	**10,574**	**5,682**	**5,382**	**1,465**	**1,565**	**59,064**

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

Table G2: Hip and Knee Joint Replacement Percentage Changes 1/7/2003 - 30/6/2004 Relative to 1/7/2002 - 30/6/2003

Type of joint replacement	**Aust. Total 1/7/'01-30/6/'02**	**Aust. Total 1/7/'02-30/6/'03**	**Aust. Total 1/7/'03-30/6/'04**	**Percentage change relative to 2002-2003**
Hip replacement				
Partial	5,601	5,660	5,878	3.9
Primary total	17,378	18,534	19,380	4.6
Revision	3,710	3,639	3,907	7.4
Total	**26,689**	**27,833**	**29,165**	**4.8**
Knee replacement				
Patellar/trochlear	246	303	299	-1.3
Unicompartmental	3,244	3,556	3,525	-0.9
Primary total	20,296	21,540	23,463	8.9
Revision	2,303	2,604	2,612	0.3
Total	**26,089**	**28,003**	**29,899**	**6.8**
National Total	**52,778**	**55,836**	**59,064**	**5.8**

Table G3: State and Territories Number and Percentage Changes for combined Hip and Knee Replacement 1/7/2003 - 30/6/2004 Relative to 1/7/2002 - 30/6/2003

States and Territories	State Total 1/7/'01-30/6/'02	State Total 1/7/'02-30/6/'03	State Total 1/7/'03-30/6/'04	Percentage change relative to 2002 – 2003
NSW	18,362	19,763	20,109	1.8
VIC	12,528	13,533	14,287	5.6
QLD	8,971	9,043	10,574	16.9
WA	4,912	5,486	5,682	3.6
SA	5,330	5,195	5,382	3.6
TAS	1,450	1,605	1,465	-8.7
ACT/NT	1,225	1,211	1,565	29.2
National Total	**52,778**	**55,836**	**59,064**	**5.8**

Figure G1: State & Territories Total Joint Replacements 1/7/2002 - 30/6/2003 & 1/7/2003 - 30/6/2004

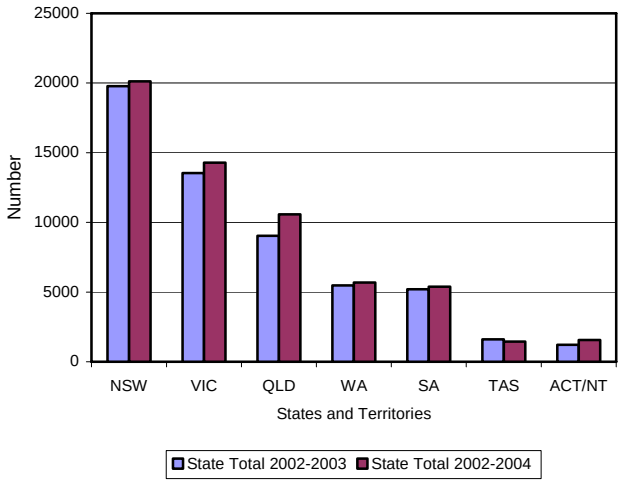


Table G4: Number of Hip and Knee replacement procedures from 1994 - 1995 to 2003 - 2004 with percentage change on previous year.

Year	*Hip replacement N*	*% change*	*Knee replacement N*	*% change*	*Total*	*% change*
1994-1995	18,635	N/A	13,371	N/A	32,006	N/A
1995-1996	19,132	2.7	14,542	8.8	33,674	5.2
1996-1997	20,127	5.2	15,456	6.3	35,583	5.7
1997-1998	21,379	6.2	17,317	12.0	38,696	8.7
1998-1999	21,800	2.0	18,832	8.7	40,632	5.0
1999-2000	22,717	4.2	19,936	5.9	42,653	5.0
2000-2001	24,285	6.9	22,252	11.6	46,537	9.1
2001-2002	26,689	9.9	26,089	17.2	52,778	13.4
2002-2003	27,833	4.3	28,003	7.3	55,836	5.8
2003-2004	29,165	4.8	29,899	6.8	59,064	5.8
***1994/95-2003/04**		**56.5**		**123.6**		**84.5**

Note: *N/A indicates not applicable. Bilaterals are counted as two replacements from 2000-01.*
** % change for entire period 1994-1995 to 2002-2003 is relative to 1994-1995*

Figure G2: Number of hip and knee replacement procedures from 1994 - 1995 to 2003 - 2004

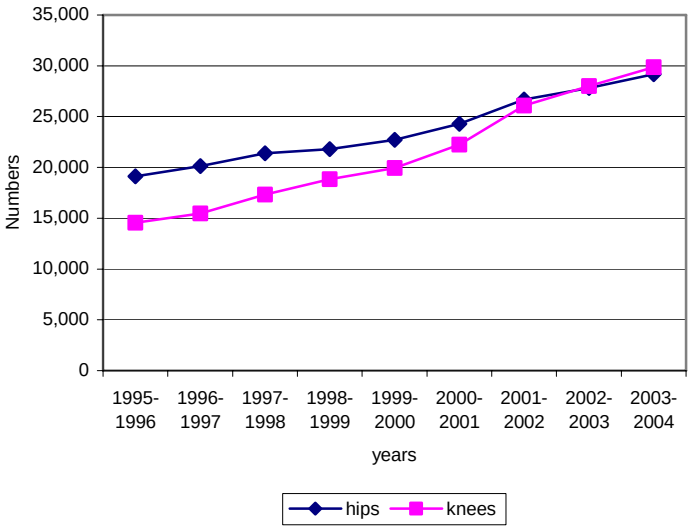


Table G5: Percentage change between 1994 - 1995 to 2003 - 2004 for both hip and knee replacement procedures, by state

Type of joint replacement	*NSW* %	*VIC* %	*QLD* %	*WA* %	*SA* %	*TAS* %	*ACT/NT* %	*Aust total* %
Hip replacement								
Partial	22.7	23.5	66.4	32.5	21.1	28.7	127.1	31.5
Primary total	58.6	74.1	100.5	85.2	46.4	34.2	103.7	69.7
Revision	42.4	39.6	68.5	46.5	3.1	31.9	132.7	42.4
Total hips	**47.9**	**56.5**	**87.2**	**66.3**	**32.9**	**32.9**	**111.7**	**56.5**
Knee replacement								
Patellar/trochlear	#	#	#	#	#	#	#	#
Unicompartmental	#	#	#	#	#	#	#	#
Primary total	75.9	94.4	128.5	110.7	68.0	79.4	315.8	95.0
Revision	75.8	107.7	115.0	81.8	98.5	306.7	80.5	94.8
Total (all types) knees	**114.1**	**121.3**	**139.3**	**124.7**	**110.2**	**110.0**	**313.1**	**123.6**
Total Hip & Knee	**77.7**	**79.4**	**112.2**	**91.2**	**63.0**	**58.9**	**184.5**	**84.5**

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

Table G6: Incidence of Hip and Knee Joint Replacement by State & Territory per 100,000 population for 2003 - 2004

Type of joint replacement	*NSW* **Pop.** *6731300*	*VIC* **Pop.** *4972800*	*QLD* **Pop.** *3882000*	*WA* **Pop.** *1982200*	*SA* **Pop.** *1534300*	*TAS* **Pop.** *482100*	*ACT/NT* **Pop** ***523900***	*AUST.* *Pop.* *20111300*
Hip replacement								
Partial	26.2	31.8	27.4	28.2	40.8	30.7	25.6	29.2
Primary total	91.3	109.6	80.0	95.4	112.0	118.0	94.5	96.4
Revision	19.1	20.8	17.1	19.2	21.9	19.7	21.8	19.4
Total	**136.6**	**162.2**	**124.6**	**142.8**	**174.7**	**168.4**	**141.8**	**145.0**
Knee replacement								
Patellar/trochlear	2.1	0.9	1.0	0.9	2.7	0.4	2.1	1.5
Unicompartmental	26.7	13.6	6.5	10.1	29.9	12.2	15.3	17.5
Primary total	120.0	99.2	127.4	120.3	125.9	110.1	125.4	116.7
Revision	13.2	11.4	13.0	12.6	17.5	12.7	14.1	13.0
Total	**162.1**	**125.1**	**147.8**	**143.9**	**176.0**	**135.4**	**156.9**	**148.7**
State total	**298.7**	**287.3**	**272.4**	**286.7**	**350.8**	**303.9**	**298.7**	**293.7**

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
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JUNE QTR KEY FIGURES, Preliminary Data
www.abs.gov.au/Ausstats/abs@.nsf/Lookup/036835783E0F360CCA256FCD0072AB46

Figure G3: Incidence of Joint Replacement by State & Territories 2003 - 2004

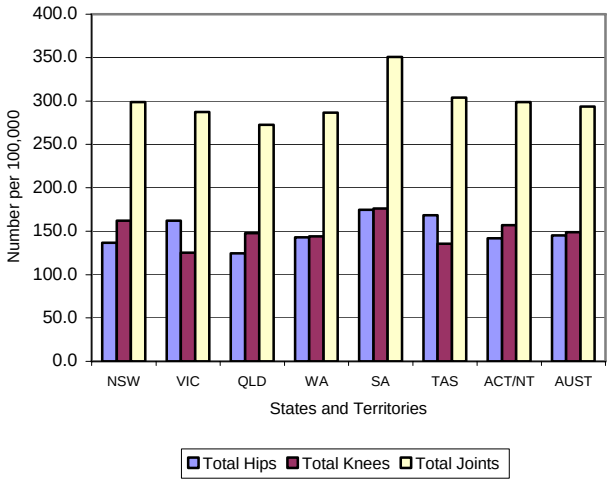

Table G7: Incidence of Different Hip and Knee Joint Replacement Procedures per 100,000 population for Australia from 1997 - 1998 to 2003 - 2004

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

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
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JUNE QTR KEY FIGURES, Preliminary Data
www.abs.gov.au/Ausstats/abs@.nsf/Lookup/036835783E0F360CCA256FCD0072AB46

Figure G4: Percentage of Revision Hip Replacement 2003 - 2004

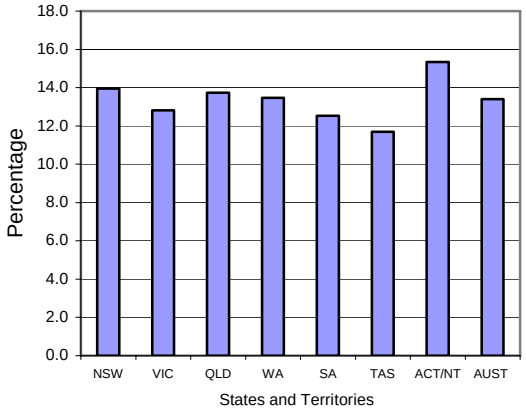


Figure G4 represents, within each state, the percentage of hip surgery that was revision surgery for 2003 - 2004. It is not possible to determine which type (partial, primary or revision) of hip replacement had been revised.

Figure G5: Percentage of Revision Knee Replacement 2003 - 2004

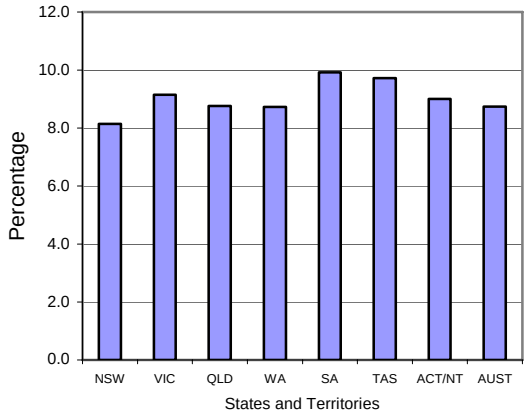


Figure G5 represents, within each state, the percentage of knee surgery that was revision surgery for 2003 - 2004. Primary total or uni as well as revision knee replacements may have been revised.

Public and Private 1997 - 1998 to 2003 - 2004

Table G8: Public & Private Percentage Changes relative to previous year per year for Hip and knee replacement for the last 7 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%)***

Figure G6: Number of Hip and Knee Joint Replacements at Public & Private Hospitals 1/7/2003 - 30/6/2004

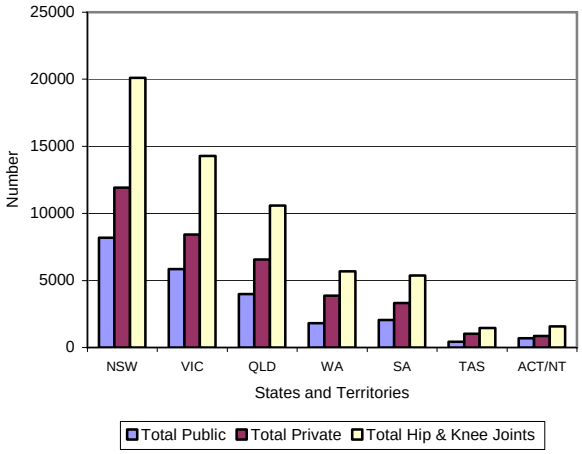


Table G9: Public & Private Percentage Changes for Hip replacement per year for the last 7 years 1st July – 30th June

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%)***

Figure G7: Number of Hip Joint Replacements at Public & Private Hospitals 1997 - 1998 to 2003 - 2004

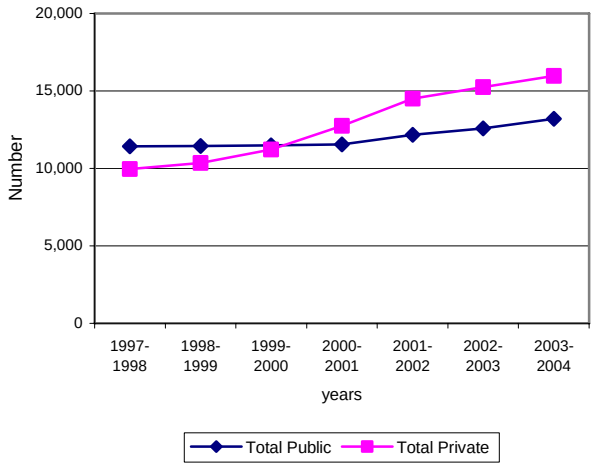


Table G10: Public & Private Percentage Changes for Knee replacement per year for the last 7 years 1st July - 30th June

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%)***

Figure G8: Number of Knee Joint Replacement at Public & Private Hospitals 1997 - 1998 to 2003 - 2004

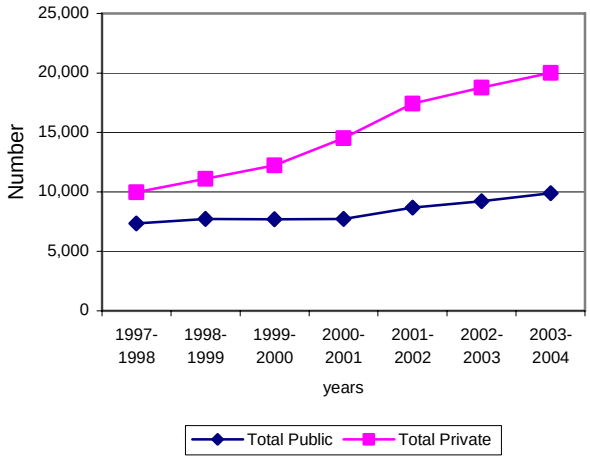


Figure G9: New South Wales - Number of Hip and Knee procedures in Public and Private Hospitals 997 - 98 to 2003 - 04

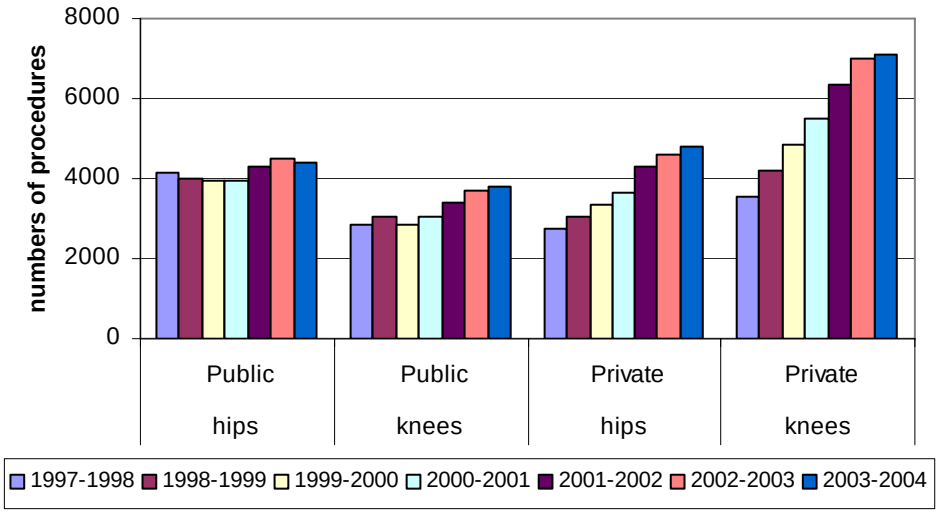


Figure G10: Victoria - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2003 - 04

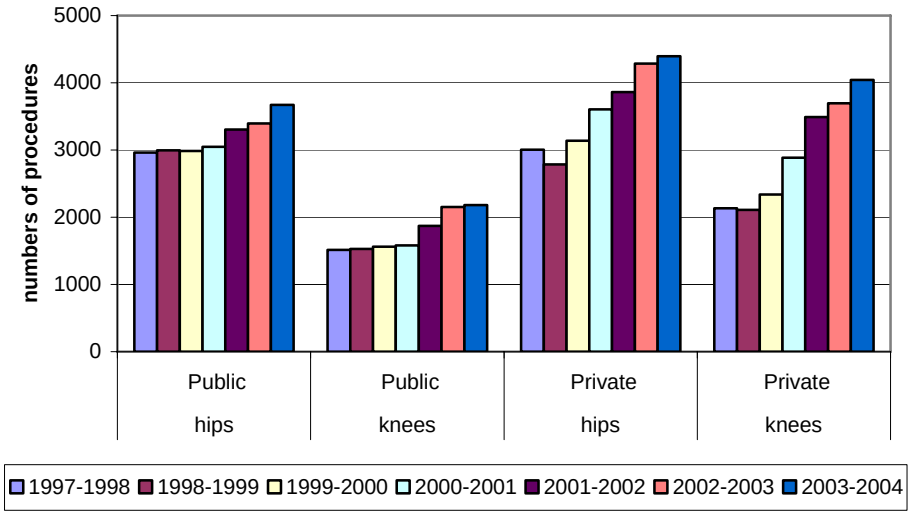


Figure G11: Queensland - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2003 - 04

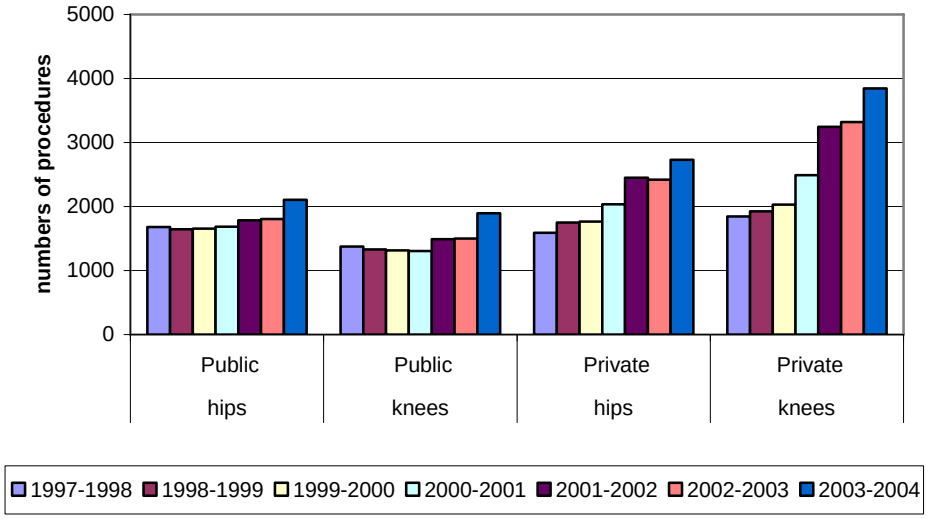


Figure G12: Western Australia - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2003 - 04

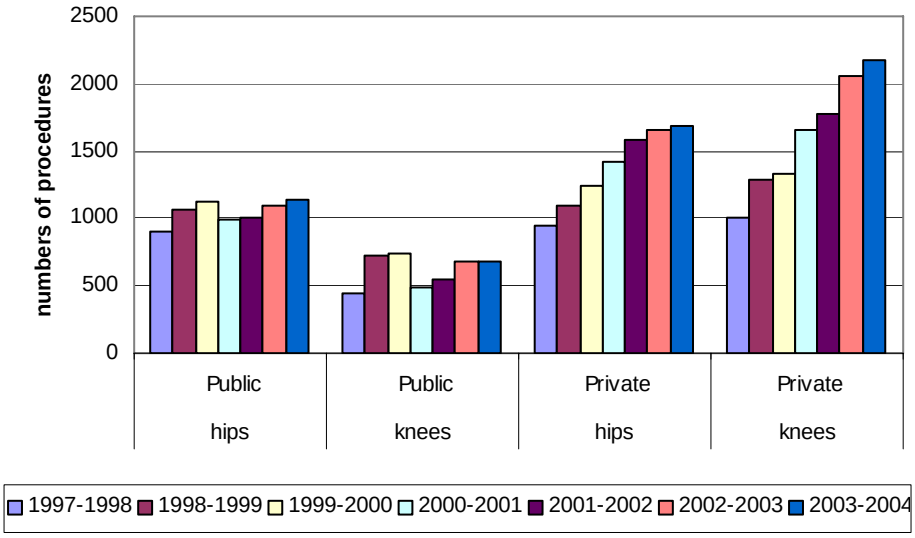


Figure G13: South Australia - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2003 - 04

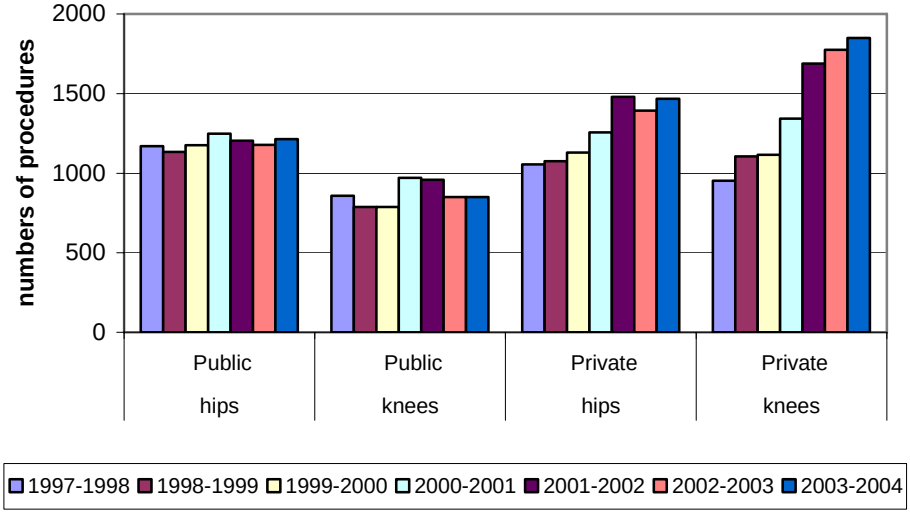


Figure G14: Tasmania - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2003 - 04

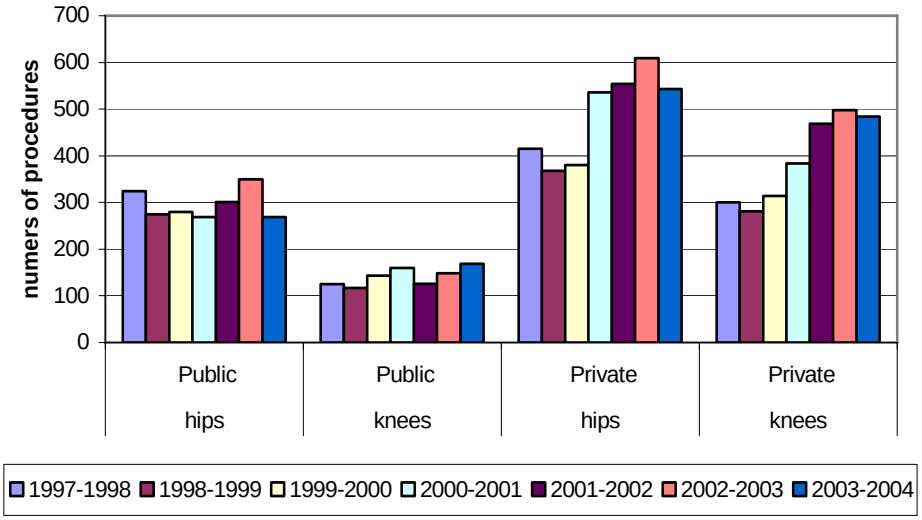
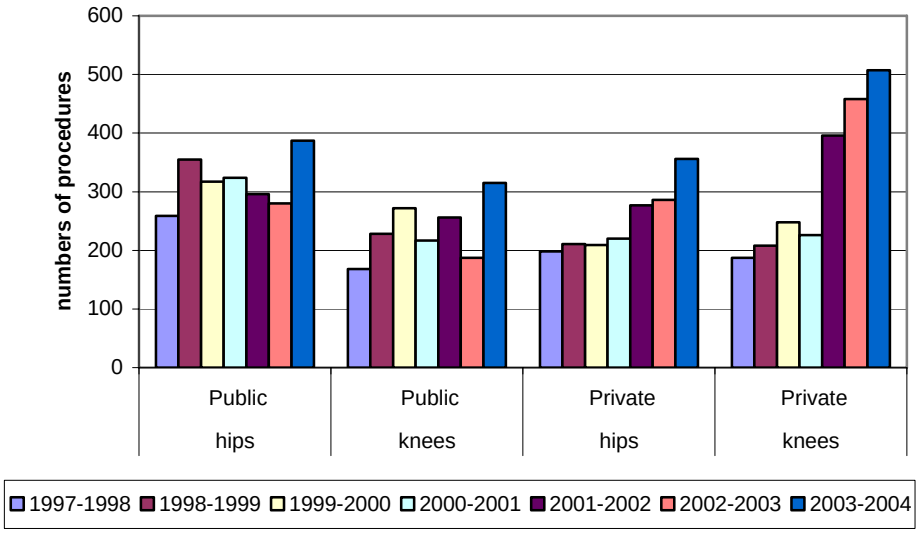


Figure G15: Australian Capital Territory/Northern Territory - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2003 - 04



ACUTE CARE EXPENDITURE

Introduction

The Registry has estimated total acute care and prostheses specific hip and knee replacement expenditure in Australia by third party payers, (i.e. government and private health insurers). In last year's Annual Report the Registry reported the estimates for both public and private sector expenditure for the three financial years from 1999-2000 to 2001-2002. This year a further analysis for the financial year 2002-2003 has been undertaken.

Data used and method of analysis

As mentioned previously each state and territory health department has provided admissions data for specified hip and knee ICD-AM-10 codes for each financial year from 1994-1995 to 2003-2004 (Figure E1 and E2). In estimating acute care expenditure the Registry repeated last years approach, using data from the National Hospital Cost Data Collection (NHCDC) as well as the state and territory health department data. Bilateral procedures are counted as one admission.

Adjustments for inflation were made by using the Consumer Price Index to determine constant 2002-2003 Australian dollars to express all expenditure. NHCDC is a sampling exercise that estimates detailed population and cost activity data. These data are available to the Registry twelve months after the end of the relevant financial year. It is for this reason that the expenditure estimates are a full financial year prior to the last available government admissions data. The NHCDC calculations do not include fees for surgeons, assistants, anaesthetists, nor imaging and pathology for the private sector. An estimate of these costs has been made using the Medical Benefits Schedule and information obtained from radiological and clinical laboratories. The total numbers for hip and knee replacement are used as the base numbers along with the NHCDC information for calculating the average cost per joint replacement and prosthesis (Table E1). These calculations are for inpatients and do not include preoperative investigations or the cost of postoperative rehabilitation. Patient co-payments are not included.

Acute care expenditure

Acute care expenditure for hip and knee replacement was estimated to be $867.8 million for 2002-2003. This is an increase of $27.8 million or 3.3% compared to 2001-2002.

Hip replacement expenditure was estimated to be $466.5 million, an increase of $36.5 million (8.5%). In the private sector expenditure increased to $273.8 million an increase of $36.2 million (15.2%). Expenditure for the public sector increased by $0.2 million to $192.6 million dollars.

Knee replacement expenditure was estimated to be $401.3 million, a decrease of $8.7 million (2.1%). In the private sector expenditure decreased to $268.9 million a decrease of $11.8 million (4.2%). Expenditure for the public sector increased by $3.0 million (2.3%) to $132.4 million.

Prosthesis costs

Prosthesis expenditure for the 2002-2003 was estimated at $302.6 million dollars. This is an increase of over $21.2 million (7.5%). Prostheses expenditure accounts for 34.9% of the total for acute care expenditure for hip and knee replacement.

The prostheses costs for hip replacements increased by $26.6 million (20.4%) (private $24.3 million, public $2.3 million). The prostheses cost for knees however decreased by $5.4 million (3.6%) (private decreased by 6.7 million, public increased by $1.2 million)

Figure E1: Numbers and percentage increases over eight years

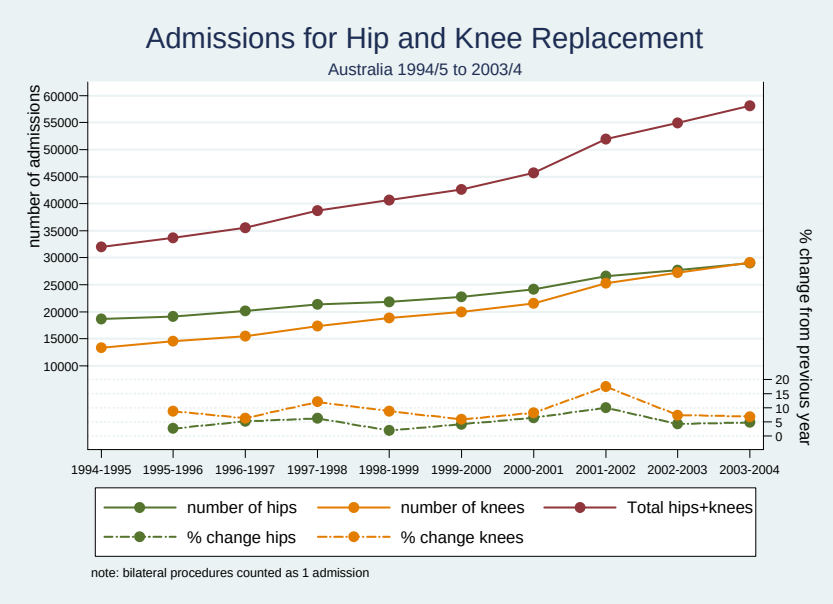


Figure E2: Numbers of procedures in public and private hospitals

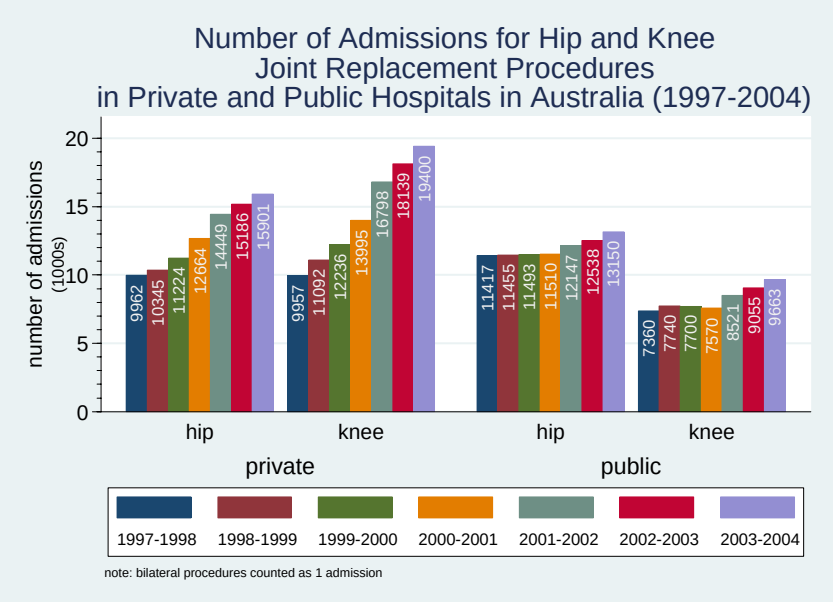
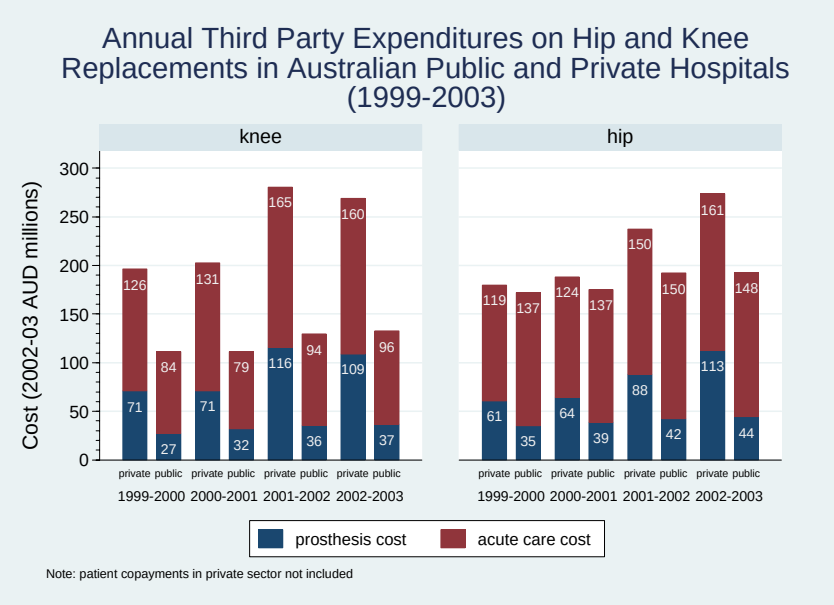


Figure E3: Expenditure on hip and knee replacements



AOA National Joint Replacement Registry
Hip Replacement Data

Data presented in this report are for the period 1/09/1999-31/12/2004 and involved the analysis of 101,952 hip procedures. This is an additional 27,605 hip procedures compared to last year's annual Report.

Demographics and diagnosis

The Registry categorises hip replacement procedures as primary partial, primary total and revision procedures. Primary partial hip replacements are sub-classified as unipolar monoblock, unipolar modular and bipolar procedures. Primary total hip replacements are sub-classified as conventional total hip, resurfacing and thrust plate procedures.

The proportion of each hip category over the entire data collection period is primary partial 16.9%, primary total 70.1% and revision procedures 12.9%. Within the primary partial category 59.4% are unipolar monoblock prostheses, 13.2% unipolar modular and 27.4% bipolar prostheses (Table H1). The primary total category is made up of 92.3% conventional total hip, 7.5% resurfacing and 0.2% thrust plate procedures (Table H1). These proportions are similar to those reported last year.

Apart from a small decrease in revision surgery there has been little change in the proportion of the three main categories since the Registry first started collecting data (Figure H1). There is also little variation between states and territories with the exception of a small increased use of primary partial replacements in some states compared to others (Figure H1).

Gender and age distribution for the various categories of hip procedure have also remained similar. Previously the Registry has published tables and graphs specifying gender and age distribution for each of the different procedures. For the sake of brevity they have not been included in this report but have been summarised (Tables H1 and H2). However the detailed tables and figures are still available for this report but have been listed separately at the Registry website.

The Registry has also reduced the information on principal diagnosis specific to each of the hip procedures in this Report. As with procedure specific gender and age information the Registry has made available more detailed diagnosis information at the website.

There has been very little change in the principal diagnosis related to each of the procedures. Primary partial hips are used most commonly in the treatment of fractured neck of femur (94.8%). Primary total hips are used principally for osteoarthritis (88.4%). Revision procedures are mainly undertaken for loosening (48.4%).

Prosthesis usage and Fixation

As mentioned in the introductory chapter, the Registry for the first time is presenting data on trends including prosthesis usage and fixation. In addition to state and territory variations in the proportional use of the major prostheses types the Registry has undertaken an analysis of the changing patterns of prosthesis use and fixation with respect to two diagnoses. They are fractured neck of femur (Tables H3 and H4) and osteoarthritis (Table H5). With respect to fractured neck of femur there has been a reduction in the use of Austin Moore prosthesis (Table H4). The most apparent change with osteoarthritis is the increasing use of resurfacing procedures (Table H5). The changes are described in more detail in the individual prostheses sections.

Prosthesis Usage and Fixation for Primary Partial Hip Replacement

Unipolar monoblock

There has been a continued decrease in the proportional use of unipolar monoblock prostheses in the last year. In the 2003 Annual Report 64% of all primary partial hip procedures involved the use of unipolar monoblock prostheses. Last year this declined to 60.9%. This Report details a

further reduction to 59.4%. Although these are small reductions in the cumulative data they are likely to translate to major changes in yearly proportional use of unipolar monoblock prostheses.

Analysis of this proportional change has demonstrated a decline in the use of unipolar monoblock prostheses for fractured neck of femur from 62.7% in 2001 to 50.9% in 2004 (Table H3). There is also changing practice observed in the use of individual prostheses. This category contains both the Austin Moore prosthesis and the Thompson. Use of the Austin Moore has decreased from 81.4% of all unipolar monoblock prostheses in 2002 to 74.7 % in 2004. The use of the Thompson prostheses however has increased from 18.6% in 2002 to 23.7% in 2004. Last year saw the introduction of a third prosthesis, the ETS (Exeter Trauma System. Only a small number of these prostheses were used (39 in 2004) (Table H4).

As has been previously reported individual states and territories differ in their choice of fixation of unipolar monoblock prostheses. Western Australia and Queensland use more cemented unipolar monoblock prostheses, while the remaining states and territories use the cemented unipolar monoblock prostheses almost exclusively. The cementless unipolar monoblock is primarily the Austin Moore (97.7%) and the cemented is the Thompson (88.7%).

Over a number of years the Registry has highlighted that the use of cement in arthroplasty procedures for patients with fractured neck of femur significantly reduces the risk of early revision. It is becoming increasingly evident that there is increasing use of cement fixation (with the exception of the ACT/NT) (Figure H3).

Unipolar modular

The proportional use of unipolar modular prostheses has increased over the last three years (9.5%, 12.1%, to 13.2%). There is considerable state and territory variation in its use (Figure H2). In all states and territories with the exception of Tasmania, femoral stems used with unipolar modular prostheses are usually cemented (Figure H4).

The Unitrax has been the most frequently used unipolar head for the last four years (Table H8, Figure H7).

Bipolar

Bipolar prostheses account for 27.4% of all partial primary hip replacements (Table H6). The proportional use of bipolar prostheses nationally has not changed appreciably during the last three years (Figure H2). There is considerable state and territory variation with minimal use in South Australia but in other states and territories bipolar prostheses are a considerable proportion of the primary partial hips undertaken (Figure H2).

Almost 80% of bipolar prostheses are used with cemented femoral stems (Figure H5).

The most commonly used bipolar head for the last four years is the UHR (Table H9, Figure H8).

Prosthesis Usage and Fixation for Primary Total Hip Replacement

Conventional total hip replacement is classified as cemented (both the acetabular and femoral components), cementless (both components) and hybrid (only one cemented component).

The 71,483 primary total hip replacement procedures recorded in the Registry are made up of 92.3% conventional total hips, 7.5% resurfacing hips and 0.2% thrust plate procedures (Table H10 and Figure H9). This years report includes an additional 19,565 total primary hip replacements compared to last year (conventional 90.9%, resurfacing 8.5% and thrust plate 0.1%).

Conventional total hip

In recent years, particularly for osteoarthritis, the proportional use of conventional total hip replacement has decreased (Figure H9). This is a consequence of increasing use of resurfacing procedures.

There has been an increase in the use of cementless total hip replacement within

Australia since the Registry commenced data collection. This trend is evident in all states and territories. Conversely there has been a significant reduction in the use of cemented conventional total hip replacement in all states and territories. The proportion of hybrid total hip replacements has remained relatively constant during this period (Figure H10). The reasons for this significant change in practice are unclear. It is almost certainly not evidence based and issues such as surgeon preference, experience and training as well as marketing may be impacting on this change.

Despite this trend the Exeter cemented stem remains the single most common stem used for primary conventional hip replacement (Table H11). The ten most common femoral stems used in conventional hip replacement for each year have also been listed in this table. Changing use of these stems can be observed (Table H11 and Figure H11). The ten most commonly used cemented stems and cementless stems are also listed in separate tables and figures. These have also been listed in a yearly manner (Tables H12 and H13 and Figures H12 and H13). The cemented stem table includes stems that have been used for both cemented total hip and hybrid total hip where the stem has been cemented.

The ten most frequently used acetabular components have also been listed. The Trident is the most frequently used acetabular component and its use is increasing (Table H14 and Figure H14). As with femoral stems the ten most frequently used cemented and cementless acetabular components have also been listed separately (Table H15 and H16 and Figures H15 and H16).

Resurfacing Hip

The use of resurfacing procedures has continued to increase. During 2004 this procedure accounted for 8.5% of all primary hip replacements (Figure H9) and 8.9% of all primary hip replacements undertaken for osteoarthritis (Table H5). The BHR is the most common resurfacing prosthesis. An increasing number of different types of resurfacing prostheses have become available in recent years. The use of these is detailed in Table H17.

Prosthesis Usage and Fixation for Revision Total Hip Replacement

The Registry classifies revisions 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 and/or acetabular component. A minor revision is a revision where a major component has not been removed or replaced. Examples include an exchange of an acetabular insert, femoral head, or both.

The Registry has information on 13,139 revision procedures. Major revision is much more common than minor revisions and they account for 84.5% of all revisions. Revision of both the femoral and acetabular component (37.6%) and the acetabular component only (37.4%) are the most common major revisions. Revision of the femoral component only is undertaken less frequently (21.1%) (Table H18).

Figure H17 presents data on the trends in the type of revision surgery being undertaken nationally and by state and territory. The proportion of partial major revisions is increasing. The proportion of major revisions where both components are replaced has been decreasing.

Bilateral Primary Hip Replacement

The number of bilateral hip procedures has increased from 4084 reported in 2004 to 6488 in this year's Report. This is an increase of 58.9%. It is due principally to a 73.6% increase in a second hip arthroplasty being performed on the contralateral side 6 or more months after the initial hip procedure (Table H19). There are many types of bilateral combinations but the two most frequent are bilateral primary total hips and bilateral resurfacing procedures. The rate of same day bilateral hip replacement for both conventional total hip and resurfacing hip remains unchanged.

Outcomes of Primary Hip Replacement

Data in this section are based on analysis of revisions of known primary procedures. A known primary procedure is one that has been recorded by the Registry and has a

procedure date during the period 1st September 1999 to 31st December 2004. There have been 1,878 revisions of primary hip procedures recorded as having a procedure data on or before the 31st December 2004 (Table H20).

Revision is the major end point the Registry uses to identify failure. As data collection commenced in 1999 and only became fully national in mid 2002, the outcomes presented in this section are all early revisions. In last year's Report the Registry detailed the analysis of 1,196 revisions of 51,760 known primary hip procedures. A further 682 revisions of known primary procedures were reported in 2004.

As mentioned in previous reports the proportion of revision procedures where the Registry already knows the details of the primary will increase with each additional year of data collection. In last year's Report this figure was 12.3%, it has now increased to 14.3%.

General Comments

As reported previously, conventional primary total hip replacement is revised less frequently than other types of primary hip arthroplasty. Resurfacing procedures have a higher early revision rate than conventional primary total hip replacement and partial hip replacements are the most frequently revised primary hip arthroplasty. Only a small number of thrust plate procedures have been performed and the numbers are insufficient to make comment on the frequency of revision.

Primary Partial Hip

The Registry has information on 17,330 primary partial hip replacements. Most partial hips are used for the management of fractured neck of femur (unipolar monoblock 97.6%, unipolar modular 93.4% and bipolar prostheses 89.3%). The revision rates for both the unipolar and bipolar prostheses are less than for unipolar monoblock prostheses.

Unipolar monoblock prostheses

Austin Moore and Thompson prostheses dominate this category of hip replacement. A third prosthesis, the ETS (Exeter Trauma System) was introduced in 2004. The Registry has recorded 40 ETS procedures in the last year and because of the small number of procedures it is not possible to comment on its performance Table H21.

In the last two annual Reports the Registry detailed the significantly higher revision rate of the Austin Moore compared to the Thompson prosthesis. It was also able to identify that the difference in revision was not prosthesis specific but that the lower revision rates were related to the use of cement fixation. Last year the Registry also reported a significantly higher mortality risk associated with the use of the cementless Austin Moore compared to the cemented Thompson and that this risk was independent of the increased number of revisions associated with the use of the Austin Moore (see mortality section). The differences observed in the outcomes of cemented and cementless monoblock prostheses have again been confirmed this year (Table H21 and Figure H18).

Unipolar modular prostheses

Unipolar modular prostheses continue to have a low early revision rate compared to other primary partial hips. Cemented stems with unipolar heads are used more frequently than cementless stems (79.4% v 20.6% respectively). Cemented stems are revised less frequently than cementless stems (1.9% compared to 2.5% percentage revision and 1.0 revision per 100 observed component years compared to 2.0). Hazard Ratio (adjusted for age and sex, cementless v cemented) = 1.920; 95% CI (0.981,3.758) P=0.0569. Revisions for the most commonly used individual combinations of stem and unipolar head are listed in Table H22.

Bipolar prostheses

Primary bipolar prostheses are revised more frequently than primary unipolar modular prostheses. A cemented stem is the most common fixation used in association with bipolar prostheses (84.6%). The cemented stem bipolar prostheses are revised less often than the cementless stems (2.0% compared to 3.2% and 1.1 compared to 2.2 revisions per 100 observed component years Hazard Ratio (adjusted for age and sex; Cementless stem v Cemented stem) = 1.733; 95%CI (1.088,2.759) P = 0.0205.

Revision for the most commonly used individual combinations of stems and bipolar prostheses are listed in Table H23.

Biomet Bipolar Prosthesis

The standard algorithm the Registry uses to assess prosthesis performance against other prostheses in the same category identified one prosthesis in the bipolar group that had a higher than anticipated rate of revision. That was the Biomet Bipolar prosthesis. Although the Registry only has a small number of procedures recorded using this prosthesis the number of revisions is statistically greater compared to the other prostheses. (9.4% compared to 2.1% and 6.4 compared to 1.1 revisions per 100 observed component years) (Hazard Ratio (adjusted for age and sex, Biomet Bipolar v all Other Bipolar) = 5.184; 95%CI (2.257,11.906) P = 0.0001) (Table H24)

The results were provided to Biomet and their response included the following comments. "Upon reviewing our internal records, regarding adverse events reported during the correlating time frame (September 1st 1999 to December 31st 2004) we found no incidents previously reported from Australia. Furthermore adverse event reports were compared against sales data for comparative analysis. Sales data extracted for the correlating time frame established the sale of 57,824 units. In contrast nineteen (19) revisions have been reported to Biomet on the Bipolar during the same period. Using this information, rate of reported revision was calculated at 0.0003%.

"With the limited information available we are unable to conclude the reason for these occurrences and multiple factors including implant position and patient compliance are considerations to the success of the reconstruction. We would welcome any additional detail related to these events to enable us to perform a more detailed analysis."

Conventional total hip

There is significantly less early revision of cemented conventional primary total hip compared to hybrid and cementless primary total hips (adjusted for age and sex). This is true when all primary diagnosis and subsequent causes for revision are included. It is also true for the single diagnosis of osteoarthritis and excluding infection as a cause for revision (Table H25, Figure H19).

Previous Registry Reports have identified that the most common cause for early revision is dislocation and that the risk of dislocation is related to head size and the use of cementless acetabular components. The further increased risk of early revision for cementless femoral stems is early femoral loosening.

Revisions for the ten most frequently used cemented femoral stems combined with commonly used cemented acetabular components are listed in Table H26. The five least revised combinations with greater than 1000 observed component years are listed in Table H27. The MS 30 / low profile cup combination has a very low rate of revision. The group of five least revised primary conventional cemented total hips also includes two Exeter stem cup combinations. The hip procedure is revised less often when the Exeter stem is combined with the Exeter cup rather than the commonly used Contemporary cup.

Revisions for frequently used individual cementless total hips combinations are listed in Table H28. The five least revised cementless combinations with over 1000 observed component years are listed in Table H29.

Revisions for frequently used hybrid total hips where the femoral stem is cemented and the acetabular component is cementless are presented in Table H30. The five least revised hybrid combinations with over 1000 observed component years are listed in Table H31.

Two individual prosthesis in the category of primary conventional total hip replacement have been identified as having a higher than anticipated number of revisions. They are the Margron stem and the SPH-Blind acetabular component.

Margron femoral stem

The Margron is a cementless stem. The Registry first highlighted the statistically significant higher than anticipated number of revision in the 2004 Annual Report. The Margron still has a significantly higher number of revisions compared to the group of all other primary cementless hip replacements (Hazard Ratio (adjusted for age and sex, Margron v all Other Cementless) = 3.161; 95%CI (2.178,4.586) P < 0.0001) (Table H28, Figure H20).

As was the situation last year dislocation remains the principal cause for revision and all revision procedures have occurred within the first year of surgery.

What remains unusual with this prosthesis is that following the revisions within the first year there have been no further revisions despite over 250 prostheses being observed for 1.5 years or longer (Figure H20).

The results of this analysis were provided to the company and the following response was received. "As stated for the previous Registry Report, a new low profile neck has been developed with a much improved ball / neck ratio, and increased range of motion before impingement.

"The new necks only became available in the field for general use since February 2004, due to production delays awaiting arrival in Australia of machinery from overseas. The effects of the new neck should show in the following year's statistics.

"The new neck and surgical techniques have made a difference in the designer surgeons practice, with only one dislocation since March 2004 in the last 95 cases and this was in a patient with Charcot Marie Tooth disease and sensory peripheral neuropathy.

"It is interesting that the retention rate is so flat for the Margron stem after the 1st year. The locking mechanism is starting to show its mid term abilities after a less aggressive post-operative weight-bearing programme was introduced. The company records of revision procedures have been reviewed and they seemed to be clustered around the last 6 months of 2003, where soon after the change in operative technique was advised.

"It is anticipated the new neck will change the statistical dislocation rates only beginning Feb.2004, as almost all sizes are now in the field."

SPH-Blind Acetabular component

The Registry first reported the higher than anticipated early revision rate of the SPH-Blind acetabular component in the 2004 Annual Report. The significantly higher number of revisions for this prosthesis compared to other cementless acetabular components persists following inclusion of the additional 2004 data. It has twice the risk of early revision compared to other cementless acetabular components (Hazard Ratio (adjusted for age and sex, SPH-Blind shell v all Other Cementless) = 2.072; 95%CI (1.428,3.006) P < 0.0001) (Figure H21).

The company was provided with this information and given the opportunity to make comment but no response was received prior to the Report being sent for publication.

Resurfacing hip replacement

Resurfacing hip procedures have a higher number of early revisions than conventional total hips. (2.2% revised compared to 1.9% for all primary conventional total hips and 1.3 revisions per 100 observed component years compared to 1.0 for primary conventional total hips) (Table H20).

The main reason for early revision is fracture of the femoral neck with over half of resurfacing procedures revised for this reason (59.3%). The rate of early revision is significantly affected by primary diagnosis, gender and age.

When considering primary diagnoses for resurfacing procedures osteoarthritis has the lowest number of early revisions (2.0%). Other diagnoses have an increased risk of early revision with the highest percentage of revision occurring in patients with rheumatoid arthritis (DDH 3.2%, AVN 3.4% and Rheumatoid 8.0%). As diagnosis affects the revision rate of resurfacing

procedures a more detailed analysis of cumulative revision comparing resurfacing to all conventional primary total hip has been undertaken. This has been for the primary diagnosis of osteoarthritis only and excludes revisions for infection. Resurfacing has a significantly higher risk of revision. Hazard ratio (adjusted for age and sex; Resurfacing hip for OA v Conventional total for OA) = 1.506; 95% CI (1.198,1.893) P = 0.0005 (Table H32 and Figure H22)

Of all patients with primary resurfacing procedures, 70.5% are males. However females have twice the risk of early revision compared to males (Hazard Ratio (adjusted for age, females v males) = 2.175; 95% CI (1.508, 3.137) P < 0.0001) (Figure H23).

When percentage revision is determined for age and gender there is a further difference between males and females. Males 65 yrs and older have a higher percentage revision compared to those under 65. In females the highest percentage revision occurs in the 55-64 year age group, but it is also higher than males in all other age groups except 65 years or older Table H33.

Appropriate patient selection is likely to significantly reduce the early revision rate of this procedure. Males below 65 yrs with a diagnosis of osteoarthritis have the lowest number of revisions and these early revisions are comparable to those achieved with primary conventional total hip replacement.

There have been an increased number of different types of resurfacing prostheses available to surgeons in recent years. The number of revisions reported for each of these prostheses is listed in Table H34.

Hip Replacement - 1/9/1999 to 31/12/2004

Definitions

Partial: *includes either unipolar or bipolar hip replacement*
Primary total: *primary 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 H1: Number of Hip Replacements by sex

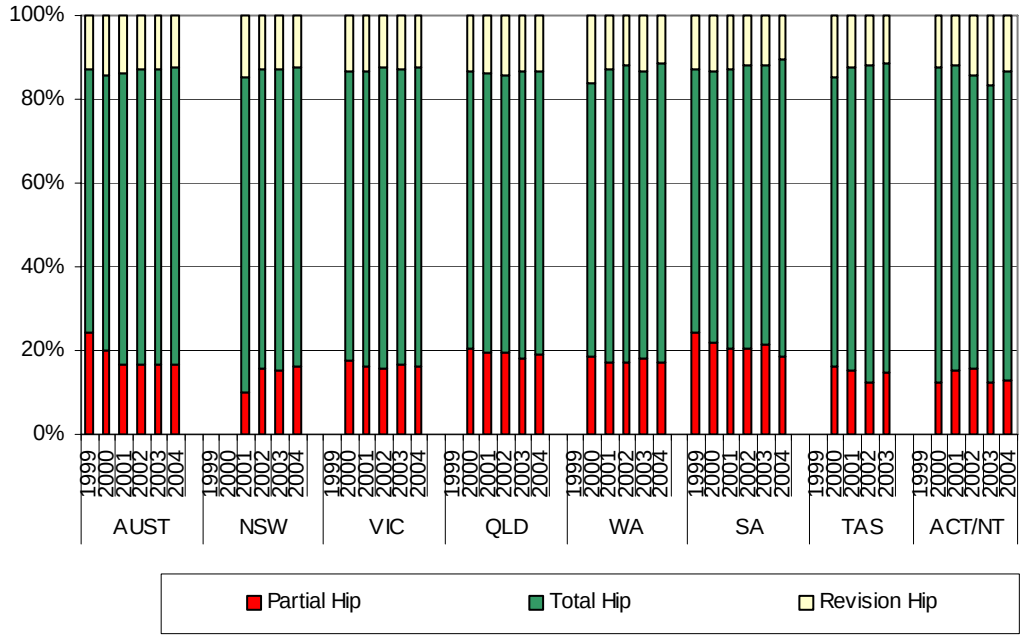
Type of hip replacement	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
Unipolar Monoblock	7731	75.0	2571	25.0	10302	59.4
Unipolar Modular	1704	74.5	582	25.5	2286	13.2
Bipolar	3494	73.7	1248	26.3	4742	27.4
Primary Partial	**12929**	**74.6**	**4401**	**25.4**	**17330**	**100.0**
Conventional Total	36418	55.2	29574	44.8	65992	92.3
Resurfacing	1587	29.5	3792	70.5	5379	7.5
Thrust Plate	32	28.6	80	71.4	112	0.2
Primary Total	**38037**	**53.2**	**33446**	**46.8**	**71483**	**100.0**
Revision	**7095**	**54.0**	**6044**	**46.0**	**13139**	**100.0**
Total	**58061**	**56.9**	**43891**	**43.1**	**101952**	**100.0**

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

Table H2: Summary statistics of age for All Hip Replacements

Type of hip replacement	*<=54*		*55-64*		*65-74*		*75-84*		*>=85*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Unipolar Monoblock	26	0.3	122	1.2	859	8.3	4310	41.8	4985	48.4	10302	59.4
Unipolar Modular	47	2.1	112	4.9	409	17.9	1019	44.6	699	30.6	2286	13.2
Bipolar	130	2.7	328	6.9	949	20.0	2140	45.1	1195	25.2	4742	27.4
Primary Partial	**203**	**1.2**	**562**	**3.2**	**2217**	**12.8**	**7469**	**43.1**	**6879**	**39.7**	**17330**	**100.0**
Conventional Total	7853	11.9	14489	22.0	22821	34.6	17691	26.8	3138	4.8	65992	92.3
Resurfacing	2789	51.8	2028	37.7	520	9.7	42	0.8	.	.	5379	7.5
Thrust Plate	46	41.1	48	42.9	16	14.3	2	1.8	.	.	112	0.2
Primary Total	**10688**	**15.0**	**16565**	**23.2**	**23357**	**32.7**	**17735**	**24.8**	**3138**	**4.4**	**71483**	**100.0**
Revision	**1371**	**10.4**	**2095**	**15.9**	**4017**	**30.6**	**4386**	**33.4**	**1270**	**9.7**	**13139**	**100.0**
Total	**12262**	**12.0**	**19222**	**18.9**	**29591**	**29.0**	**29590**	**29.0**	**11287**	**11.1**	**101952**	**100.0**

Figure H1: Trends in Usage of Type of Hip Replacement by State and Territory



Note: *see table NJRR1Dates of implementation by state and territory*

Table H3: Trends in Hip Replacement for Fractured Neck of Femur

Type of hip replacement	*1999*		*2000*		*2001*		*2002*		*2003*		*2004*		*Total*
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*
Unipolar Monoblock	114	77.6	742	62.1	1874	62.7	2360	55.0	2432	51.8	2535	50.9	10057
Unipolar Modular	1	0.7	163	13.6	272	9.1	399	9.3	609	13.0	690	13.8	2134
Bipolar	22	15.0	198	16.6	539	18.0	1091	25.4	1161	24.7	1224	24.6	4235
Conventional Total	10	6.8	92	7.7	302	10.1	441	10.3	490	10.4	534	10.7	1869
Total	**147**	**100.0**	**1195**	**100.0**	**2987**	**100.0**	**4291**	**100.0**	**4692**	**100.0**	**4983**	**100.0**	**18295**

Table H4: Trends in Hip Replacement for Fractured Neck of Femur - Unipolar Monoblock

Type of hip replacement	*1999*		*2000*		*2001*		*2002*		*2003*		*2004*		*Total*
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*
Austin-Moore Type	114	100.0	491	66.2	1473	78.6	1922	81.4	1922	79.0	1894	74.7	7816
ETS	.	.	.	.	.	.	.	.	.	.	39	1.5	39
Thompson Type	.	.	251	33.8	401	21.4	438	18.6	510	21.0	602	23.7	2202
Total	**114**	**100.0**	**742**	**100.0**	**1874**	**100.0**	**2360**	**100.0**	**2432**	**100.0**	**2535**	**100.0**	**10057**

Table H5: Trends in Hip Replacement for Osteoarthritis

Type of hip replacement	*1999*		*2000*		*2001*		*2002*		*2003*		*2004*		*Total*
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*
Unipolar Monoblock	2	0.6	24	0.7	39	0.4	36	0.2	34	0.2	26	0.1	161
Unipolar Modular	.	.	3	0.1	8	0.1	15	0.1	27	0.2	27	0.2	80
Bipolar	.	.	12	0.4	34	0.3	45	0.3	63	0.4	45	0.3	199
Conventional Total	327	99.4	3194	95.8	9814	93.1	13902	90.8	14993	90.5	15879	90.5	58109
Resurfacing	.	.	89	2.7	628	6.0	1281	8.4	1426	8.6	1557	8.9	4981
Thrust Plate	.	.	13	0.4	23	0.2	30	0.2	19	0.1	20	0.1	105
Total	**329**	**100.0**	**3335**	**100.0**	**10546**	**100.0**	**15309**	**100.0**	**16562**	**100.0**	**17554**	**100.0**	**63635**

Prosthesis Fixation and Usage for Hip Replacement

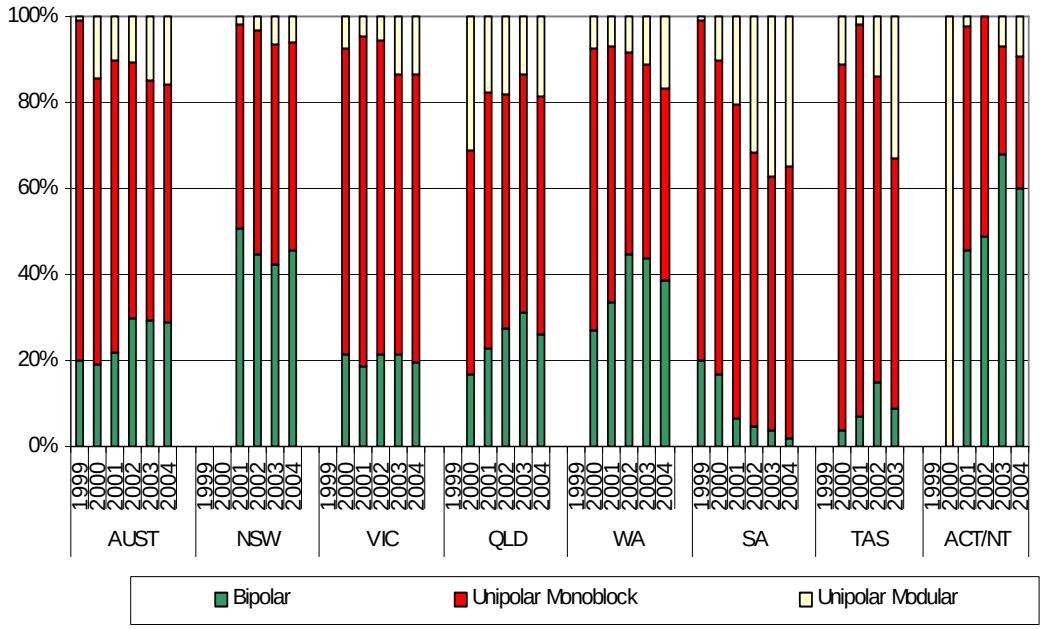
1/9/1999 to 31/12/2004

Primary Partial Hip Replacement

Table H6: Prosthesis fixation - Partial Hip Replacement

Fixation	***Unipolar Monoblock***		***Unipolar Modular***		***Bipolar***		***All Patients***	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Cemented	2247	13.0	1814	10.5	4014	23.2	8075	46.6
Cementless	8055	46.5	472	2.7	728	4.2	9255	53.4
Total	**10302**	**59.4**	**2286**	**13.2**	**4742**	**27.4**	**17330**	**100.0**

Figure H2: Trends in Usage for Primary Partial Hip Replacement by State and Territory



Note: *ACT/NT 2000 incomplete year of data numbers are therefore small*

Figure H3: Trends in Prosthesis Fixation - Unipolar Monoblock by State and Territory

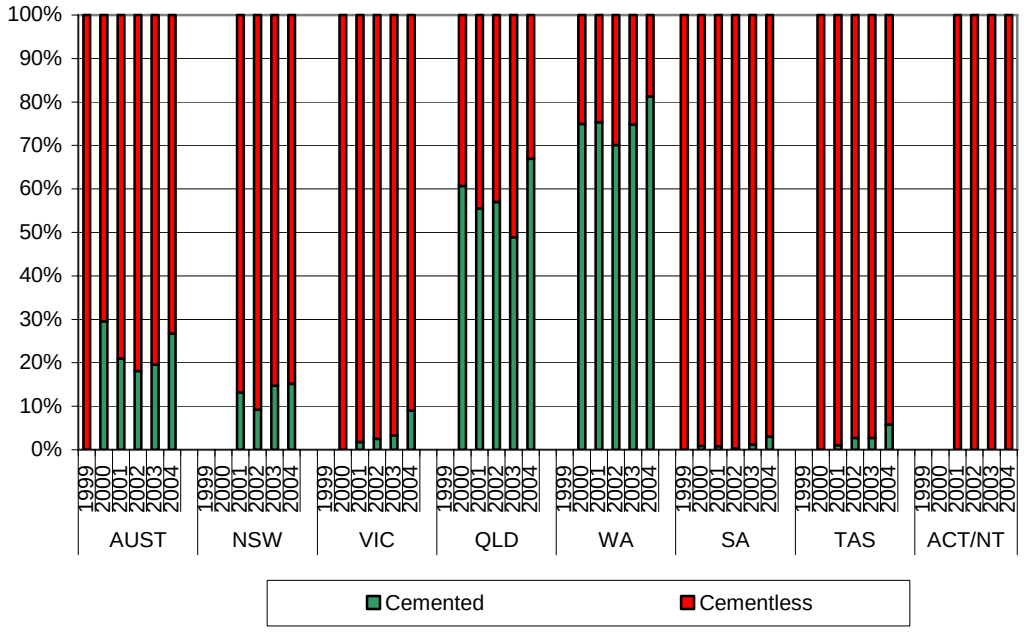


Figure H4: Trends in Prosthesis Fixation - Femoral components used with Unipolar Modular prostheses by State and Territory

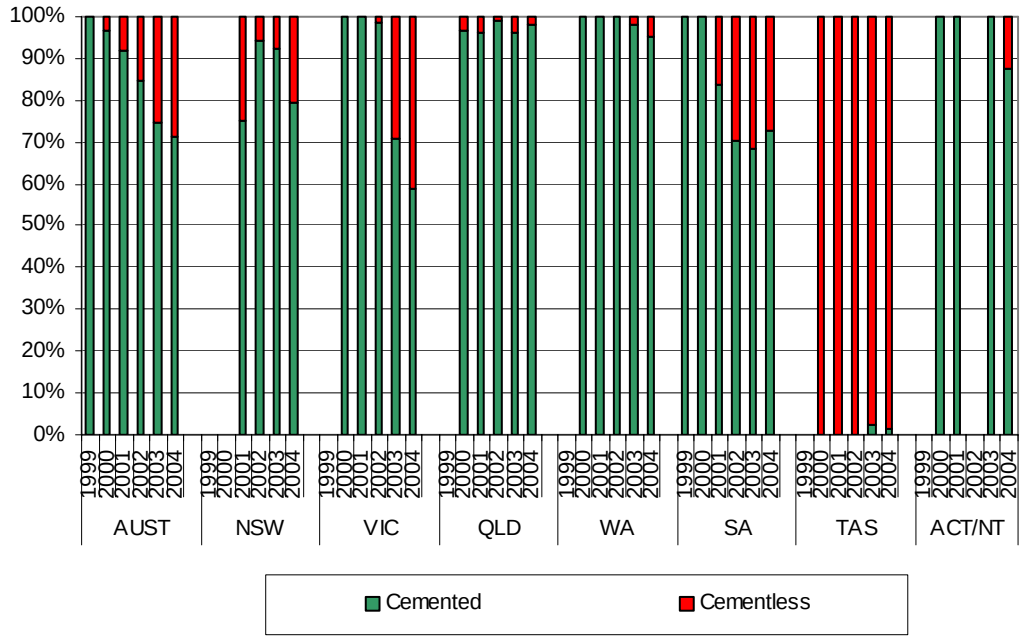


Figure H5: Trends in Prosthesis Fixation - Femoral components used with Bipolar prostheses by State and Territory

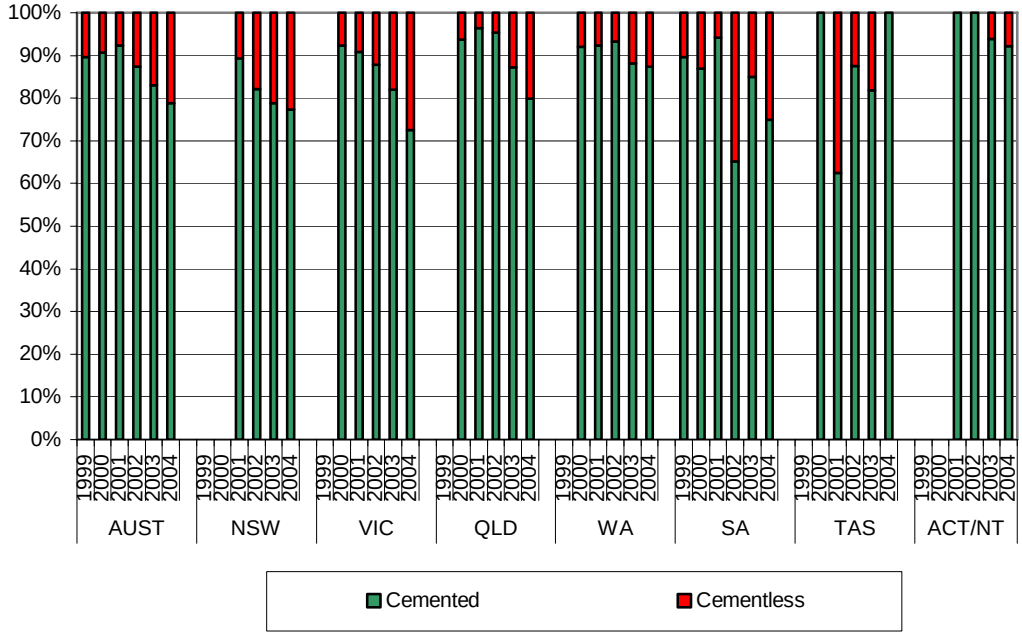


Table H7: Unipolar monoblock Prostheses used in Primary Partial Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Austin-Moore Type (116)	Austin-Moore Type (518)	Austin-Moore Type (1514)	Austin-Moore Type (1970)	Austin-Moore Type (1960)	Austin-Moore Type (1928)
2		Thompson Type (259)	Thompson Type (417)	Thompson Type (450)	Thompson Type (521)	Thompson Type (609)
3						ETS (40)
Total N Procedures	116	777	1931	2420	2481	2577
Total N Prosthesis Types	1	2	2	2	2	3

Note: *only three unipolar monoblock prostheses types are available.*

Figure H6: Top 5 Unipolar Monoblock Prostheses used in Primary Partial Hips

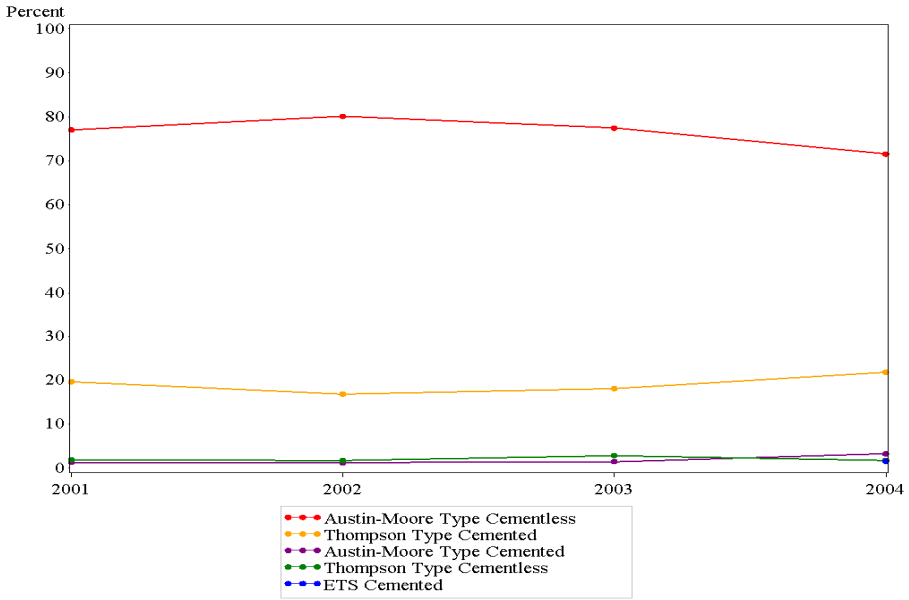


Table H8: Top 10 Unipolar Modular Heads used in Primary Partial Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Unipolar Head (S&N) (1)	Hemi Head (Mathys) (50)	Unitrax (64)	Unitrax (118)	Unitrax (193)	Unitrax (190)
2		Ultima (40)	Hemi Head (Mathys) (58)	Hemi Head (Mathys) (79)	Unipolar Head (Sulzer) (113)	Unipolar Head (S&N) (142)
3		Unipolar Head (S&N) (30)	Unipolar (Zimmer) (49)	Unipolar Head (S&N) (59)	Unipolar Head (S&N) (89)	Hemi Head (Mathys) (108)
4		Unipolar Type (Zimmer) (23)	Unipolar Head (S&N) (43)	Unipolar Head (Sulzer) (55)	VerSys Endo (74)	Unipolar Head (Sulzer) (99)
5		Unitrax (14)	Ultima (41)	Unipolar (Zimmer) (47)	Hemi Head (Mathys) (62)	VerSys Endo (85)
6		Modular Endo (7)	Unipolar Head (Sulzer) (20)	Hemi Head (Depuy) (32)	Hemi Head (Depuy) (46)	Unipolar (64) (Endoprothetik)
7		Ballhead (Sulzer) (4)	Hemi Head (Depuy) (12)	Ultima (24)	Unipolar (38) (Endoprothetik)	Modular Endo (13)
8		Hemi Head (Depuy) (2)	Modular Endo (3)	Ballhead (Sulzer) (6)	Unipolar Type (Zimmer) (20)	Hemi Head (Depuy) (12)
9			VerSys Endo (2)	Lubinus SP II (5)	Ultima (16)	Unipolar Head (Zimmer) (12)
10				VerSys Endo (3)	Ballhead (Sulzer) (1)	Ultima (8)
% Procedures using Top 10	100%	100%	100%	99.1%	100%	99.2%
Total N Procedures	1	170	292	432	652	739
Total N Prosthesis Types	1	8	9	12	10	12

Figure H7: Top 5 Unipolar Modular Heads used in Primary Partial Hips

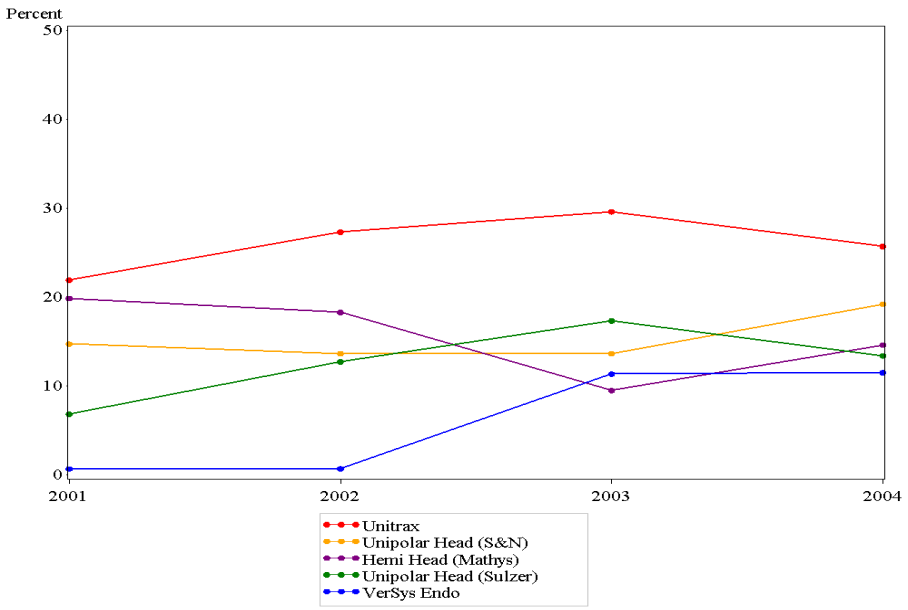
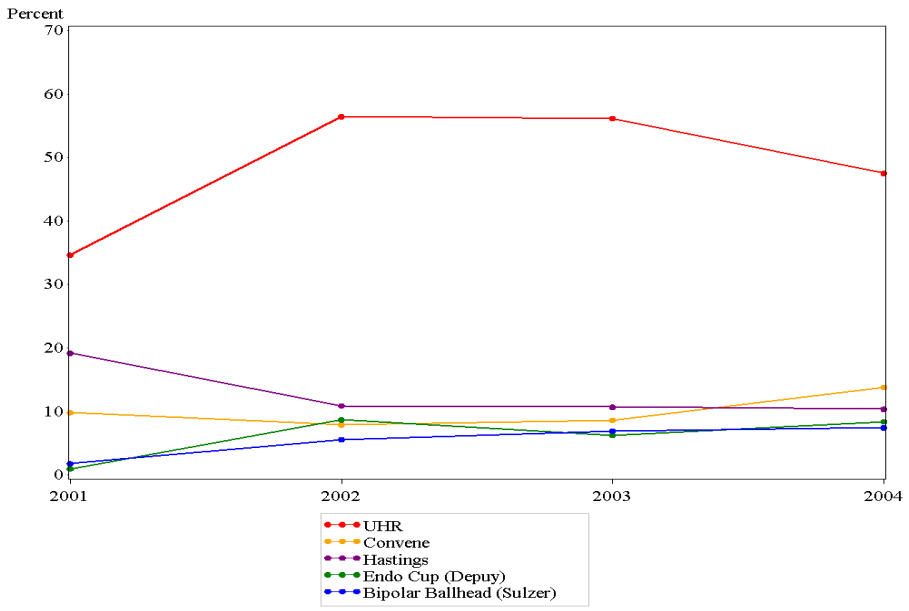


Table H9: Top 10 Bipolar Heads used in Primary Partial Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Centrax (23)	Centrax (99)	UHR (215)	UHR (689)	UHR (736)	UHR (633)
2	UHR (5)	UHR (60)	Centrax (172)	Hastings (133)	Hastings (140)	Convene (184)
3	Bipolar Type (Biomet) (1)	Hastings (45)	Hastings (119)	Endo Cup (Depuy) (106)	Convene (113)	Hastings (138)
4		Convene (6)	Convene (61)	Convene (96)	Bi Ballhead (Sulzer) (91)	Endo Cup (Depuy) (112)
5		Bi Ballhead (Sulzer) (5)	Bipolar Type (Zimmer) (18)	Bi Ballhead (Sulzer) (68)	Endo Cup (Depuy) (82)	Bi Ballhead (Sulzer) (99)
6		Bipolar Head (Lima) (3)	Bi Ballhead (Sulzer) (11)	Bipolar Type (Zimmer) (43)	Multipolar Bipolar (58)	Multipolar Bipolar (88)
7		Bipolar Head (Mathys) (3)	Bipolar Type (Biomet) (6)	Bipolar Head (Mathys) (29)	Bipolar Head (Mathys) (39)	Bipolar Head (Mathys) (21)
8		Bipolar Type (Biomet) (3)	Endo Cup (Depuy) (6)	Bipolar Type (Biomet) (16)	Bipolar Head (Lima) (19)	Bipolar Type (Biomet) (19)
9		Ultima (2)	Bipolar Head (Mathys) (5)	Centrax (10)	Bipolar Type (Biomet) (19)	Bipolar Head (Lima) (10)
10		Bipolar Head (1)	Bipolar Head (2)	Bipolar Head (Lima) (8)	Self-Centering (5)	Tandem (9)
% Procedures using Top 10	100%	100%	99%	98.1%	99.3%	98.5%
Total N Procedures	29	227	621	1221	1311	1333
Total N Prosthesis Types	3	10	14	16	12	16

Figure H8: Top 5 Bipolar Heads used in Primary Partial Hips



Prosthesis Fixation and Usage for Hip Replacement

Primary Total Hip Replacement

Table H10: Prosthesis Fixation - Primary Total Hip Replacement, by State

Prosthesis Fixation	*Conventional Hips*						*Resurfacing*		*Thrust Plate*		*Total*	
	Cemented		*Cementless*		*Hybrid*							
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
ACT/NT	56	3.6	928	60.4	429	27.9	124	8.1	.	.	1537	100.0
NSW	861	4.5	10993	57.4	5753	30.0	1539	8.0	7	0.0	19153	100.0
QLD	3700	32.8	2813	25.0	4061	36.0	692	6.1	.	.	11266	100.0
SA	1725	20.2	2879	33.8	3358	39.4	557	6.5	.	.	8519	100.0
TAS	271	10.7	1953	76.8	285	11.2	23	0.9	10	0.4	2542	100.0
VIC	3251	16.0	8272	40.6	6594	32.4	2233	11.0	1	0.0	20351	100.0
WA	702	8.7	4246	52.3	2862	35.3	211	2.6	94	1.2	8115	100.0
Australia	**10566**	**14.8**	**32084**	**44.9**	**23342**	**32.7**	**5379**	**7.5**	**112**	**0.2**	**71483**	**100.0**

Figure H9: Trends in Usage for Primary Total Hip Replacement by State and Territory

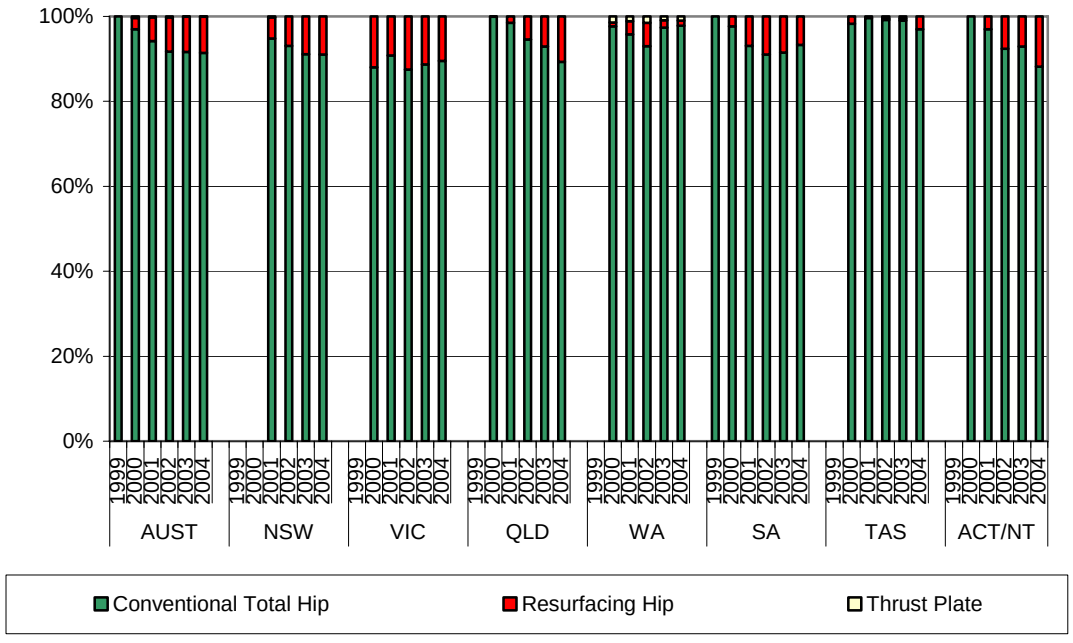


Figure H10: Trends in Prosthesis Fixation - Primary Conventional Total by State and Territory

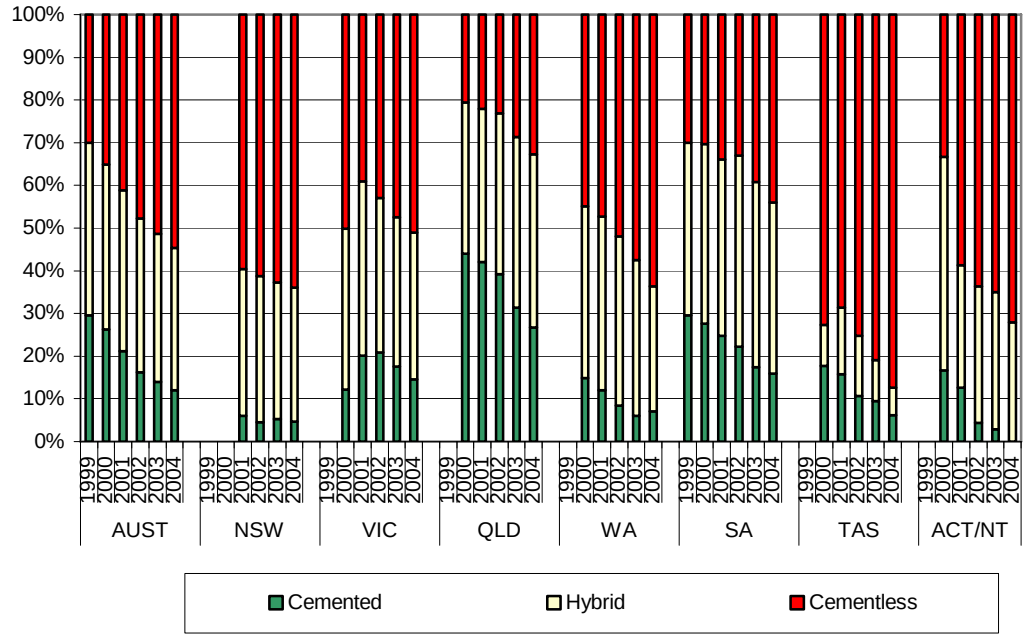


Table H11: Top 10 Femoral components used in Primary Conventional Total Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Exeter (109)	Exeter (840)	Exeter (2768)	Exeter (3601)	Exeter (4012)	Exeter (4199)
2	Mallory-Head (53)	Spectron EF (292)	Omnifit (741)	ABGII (1069)	ABGII (1026)	Synergy (1356)
3	Spectron EF (35)	Omnifit (284)	Spectron EF (711)	Spectron EF (840)	Synergy (998)	ABGII (897)
4	Omnifit (27)	Elite Plus (214)	Elite Plus (637)	Elite Plus (751)	VerSys (881)	Alloclassic (836)
5	MS 30 (26)	Mallory-Head (192)	Alloclassic SL (463)	Synergy (747)	Spectron EF (781)	Spectron EF (771)
6	Definition (22)	Charnley (185)	Secur-Fit Plus (443)	VerSys (701)	Secur-Fit Plus (709)	Secur-Fit Plus (756)
7	Charnley (18)	Definition (163)	CPT (408)	Omnifit (688)	Omnifit (618)	VerSys (678)
8	APR (14)	MS 30 (146)	ABGII (401)	Alloclassic SL (687)	C-Stem (560)	Accolade (571)
9	CLS (14)	CPT (113)	Synergy (393)	Secur-Fit Plus (590)	Alloclassic SL (492)	CPT (550)
10	S-Rom (12)	Secur-Fit Plus (109)	Charnley (383)	C-Stem (484)	Secur-Fit (482)	Omnifit (514)
% Procedures using Top 10	87.1%	68.6%	65.5%	64.3%	62%	62.3%
Total N Procedures	379	3702	11220	15802	17017	17872
Total N Prosthesis Types	24	53	73	87	83	84

Figure H11: Top 5 Femoral components used in Primary Conventional Total Hips

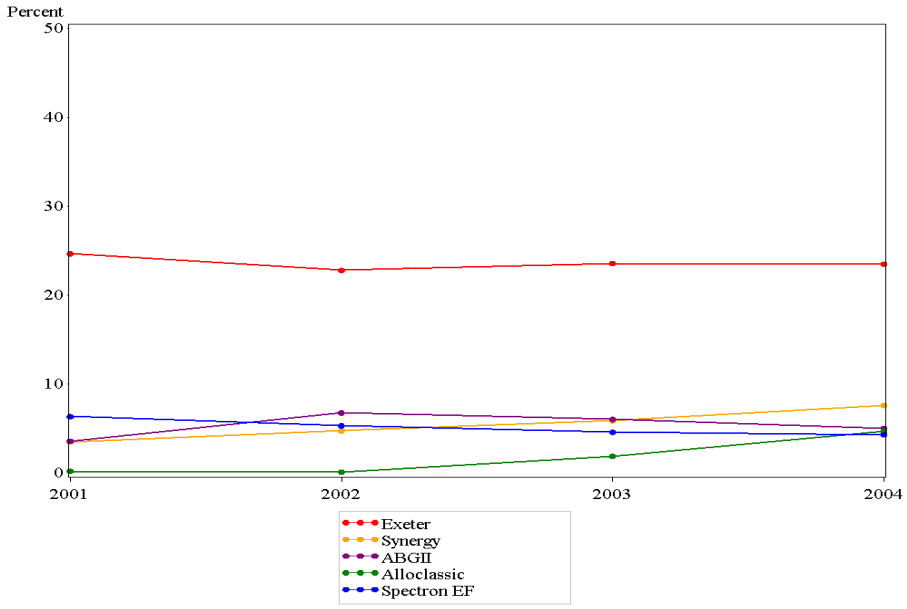


Table H12: Top 10 Cemented Femoral components used in Primary Conventional Total Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Exeter (109)	Exeter (840)	Exeter (2765)	Exeter (3599)	Exeter (4012)	Exeter (4198)
2	Spectron EF (35)	Spectron EF (292)	Spectron EF (711)	Spectron EF (840)	Spectron EF (781)	Spectron EF (771)
3	MS 30 (26)	Elite Plus (214)	Elite Plus (637)	Elite Plus (751)	C-Stem (560)	CPT (550)
4	Omnifit (26)	Omnifit (195)	CPT (408)	C-Stem (484)	CPT (476)	C-Stem (446)
5	Definition (22)	Charnley (185)	Charnley (383)	CPT (462)	Elite Plus (444)	CPCS (371)
6	Charnley (18)	Definition (163)	MS 30 (355)	Charnley (398)	MS 30 (357)	Elite Plus (343)
7	Elite Plus (9)	MS 30 (146)	Omnifit (349)	MS 30 (384)	Omnifit (339)	Omnifit (279)
8	Mallory-Head (6)	CPT (113)	C-Stem (289)	Omnifit (366)	Charnley (321)	MS 30 (248)
9	Perfecta IMC (4)	C-Stem (72)	Definition (157)	CPCS (180)	CPCS (243)	Charnley (199)
10	C-Stem (3)	Freeman (55)	VerSys (121)	VerSys (164)	VerSys (144)	VerSys (107)
% Procedures using Top 10	97.4%	95.5%	93.9%	93.1%	93.3%	93.4%
Total N Procedures	265	2382	6575	8197	8226	8047
Total N Prosthesis Types	14	27	42	44	44	39

Figure H12: Top 5 Cemented Femoral components used in Primary Conventional Total Hips

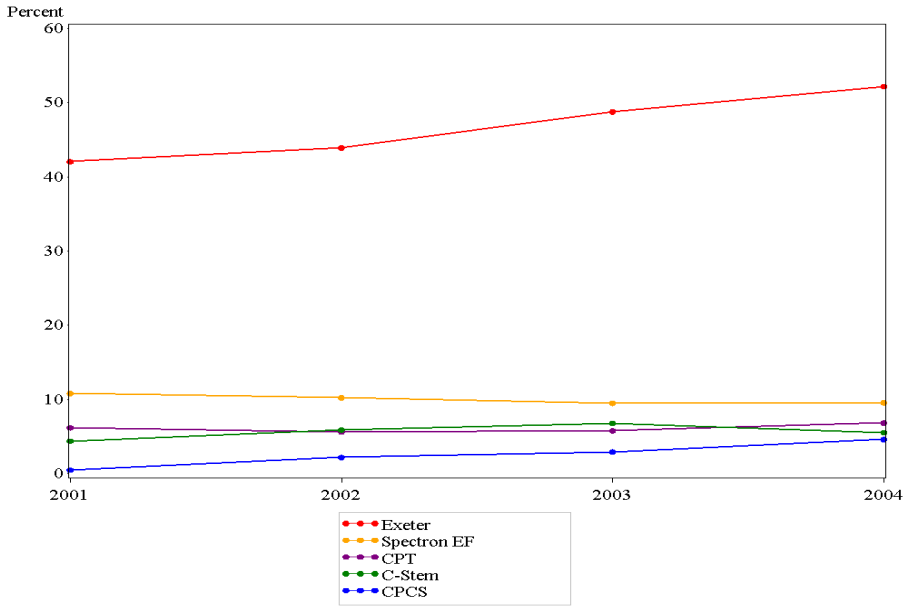


Table H13: Top 10 Cementless Femoral components used in Primary Conventional Total Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Mallory-Head (47)	Mallory-Head (186)	Alloclassic SL (463)	ABGII (1066)	ABGII (1022)	Synergy (1346)
2	APR (14)	Secur-Fit Plus (109)	Secur-Fit Plus (441)	Synergy (740)	Synergy (977)	ABGII (897)
3	CLS (14)	Secur-Fit (98)	ABGII (400)	Alloclassic SL (687)	VerSys (737)	Alloclassic (834)
4	S-Rom (12)	Omnifit (89)	Omnifit (392)	Secur-Fit Plus (589)	Secur-Fit Plus (708)	Secur-Fit Plus (755)
5	Citation (10)	S-Rom (82)	Synergy (391)	VerSys (537)	Alloclassic SL (492)	VerSys (571)
6	Perfecta (4)	Synergy (82)	Secur-Fit (317)	Secur-Fit (474)	Secur-Fit (482)	Accolade (569)
7	VerSys (4)	ABGII (72)	S-Rom (247)	S-Rom (426)	S-Rom (478)	Corail (492)
8	Secur-Fit Plus (3)	CLS (72)	Mallory-Head (222)	Omnifit (322)	Corail (375)	S-Rom (490)
9	Meridian (2)	VerSys (65)	VerSys (217)	CLS (258)	Accolade (334)	Secur-Fit (446)
10	Matrix-Opti-Fix Plus (1)	Alloclassic SL (62)	CLS (206)	Corail (256)	Mallory-Head (329)	Mallory-Head (396)
% Procedures using Top 10	97.4%	69.5%	71%	70.4%	67.5%	69.2%
Total N Procedures	114	1320	4645	7605	8791	9825
Total N Prosthesis Types	13	33	51	67	61	63

Figure H13: Top 5 Cementless Femoral components used in Primary Conventional Total Hips

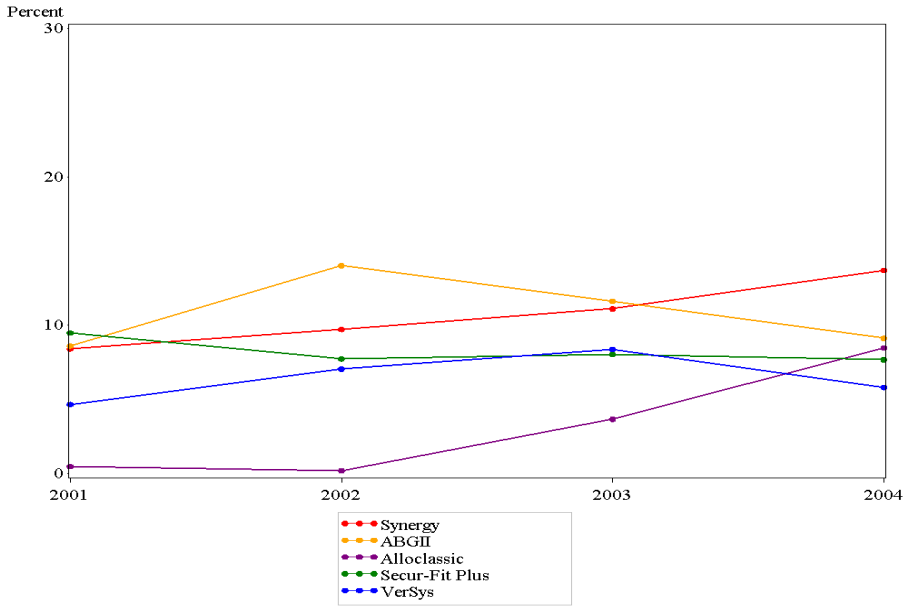


Table H14: Top 10 Acetabular components used in Primary Conventional Total Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Vitalock (116)	Vitalock (614)	Trident (1650)	Trident (2830)	Trident (3978)	Trident (4675)
2	Mallory-Head (55)	Reflection (382)	Reflection (1205)	Reflection (1787)	Reflection (1994)	Reflection (2399)
3	Reflection (28)	Mallory-Head (338)	Vitalock (1088)	Trilogy (1286)	Trilogy (1519)	Trilogy (1371)
4	Low Profile Cup (25)	Trident (294)	Duraloc (800)	ABGII (1212)	Vitalock (950)	Pinnacle (1076)
5	Omnifit (21)	Duraloc (209)	Trilogy (707)	Vitalock (1180)	Duraloc (899)	Allofit (865)
6	Duraloc (19)	Contemporary (199)	Mallory-Head (701)	Duraloc (1116)	ABGII (823)	Contemporary (789)
7	CLS (15)	Secur-Fit (191)	ABGII (673)	Contemporary (719)	Allofit (790)	ABGII (738)
8	Contemporary (14)	ABGII (158)	Contemporary (527)	Mallory-Head (719)	Contemporary (766)	Duraloc (613)
9	Charnley LPW (13)	Trilogy (130)	Exeter (474)	Allofit (630)	Mallory-Head (728)	Mallory-Head (595)
10	Apollo (12)	Exeter (123)	Fitmore (424)	Fitmore (603)	Pinnacle (535)	Fitmore (578)
% Procedures using Top 10	83.9%	71.3%	73.5%	76.5%	76.3%	76.7%
Total N Procedures	379	3702	11220	15802	17017	17872
Total N Prosthesis Types	23	44	61	73	74	71

Figure H14: Top 5 Acetabular components used in Primary Conventional Total Hips

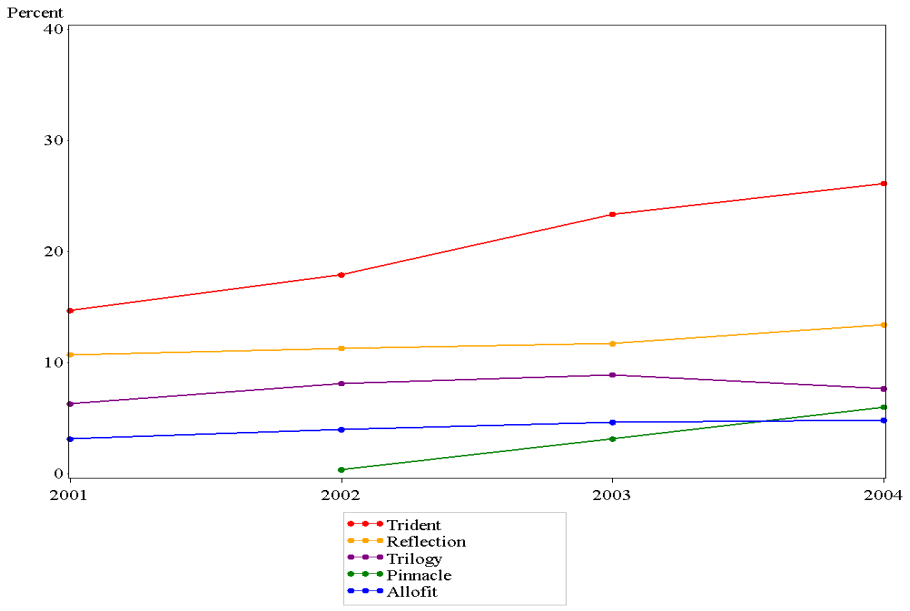


Table H15: Top 10 Cemented Acetabular components used in Primary Conventional Total Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Low Profile Cup (25)	Contemporary (199)	Contemporary (527)	Contemporary (719)	Contemporary (766)	Contemporary (789)
2	Omnifit (16)	Exeter (123)	Exeter (474)	Reflection (341)	Exeter (256)	Reflection (310)
3	Contemporary (14)	Reflection (90)	Reflection (236)	Exeter (314)	Reflection (256)	Exeter (224)
4	Charnley LPW (13)	Low Profile Cup (84)	Charnley (204)	Charnley Ogee (232)	Charnley Ogee (199)	Charnley Ogee (187)
5	Apollo (12)	Charnley LPW (82)	Charnley Ogee (202)	Charnley (189)	Elite Plus LPW (148)	Elite Plus Ogee (116)
6	Exeter (12)	Charnley Ogee (75)	Elite Plus Ogee (155)	Elite Plus Ogee (125)	Low Profile Cup (130)	ZCA (94)
7	Charnley Ogee (7)	Elite Plus Ogee (65)	Low Profile Cup (139)	Elite Plus LPW (118)	Elite Plus Ogee (109)	Low Profile Cup (91)
8	Reflection (7)	Omnifit (62)	ZCA (102)	Low Profile Cup (104)	Charnley (102)	Elite Plus LPW (50)
9	Charnley (2)	Charnley (58)	Apollo (79)	Charnley LPW (88)	ZCA (90)	Charnley (39)
10	Duramer (2)	ZCA (52)	Charnley LPW (63)	Apollo (81)	Brunswick (62)	Brunswick (36)
% Procedures using Top 10	98.2%	89.8%	90.5%	87.9%	87%	87.7%
Total N Procedures	112	991	2409	2628	2435	2207
Total N Prosthesis Types	12	30	37	35	41	39

Figure H15: Top 5 Cemented Acetabular components used in Primary Conventional Total Hips

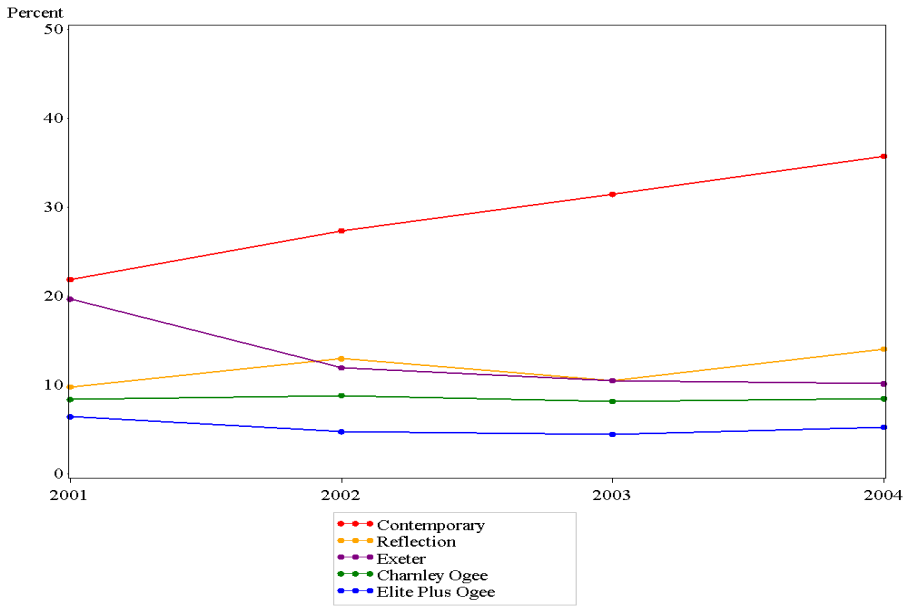


Table H16: Top 10 Cementless Acetabular components used in Primary Conventional Total Hips

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Vitalock (116)	Vitalock (610)	Trident (1648)	Trident (2819)	Trident (3974)	Trident (4663)
2	Mallory-Head (55)	Mallory-Head (336)	Vitalock (1082)	Reflection (1446)	Reflection (1738)	Reflection (2089)
3	Reflection (21)	Trident (293)	Reflection (969)	Trilogy (1279)	Trilogy (1519)	Trilogy (1369)
4	Duraloc (19)	Reflection (292)	Duraloc (793)	ABGII (1212)	Vitalock (949)	Pinnacle (1074)
5	CLS (15)	Duraloc (207)	Trilogy (706)	Vitalock (1178)	Duraloc (894)	Allofit (863)
6	Artek (12)	Secur-Fit (189)	Mallory-Head (698)	Duraloc (1113)	ABGII (822)	ABGII (736)
7	Secur-Fit (10)	ABGII (158)	ABGII (672)	Mallory-Head (714)	Allofit (783)	Duraloc (612)
8	Omnifit (5)	Trilogy (130)	Fitmore (423)	Allofit (628)	Mallory-Head (727)	Mallory-Head (594)
9	Trilogy (5)	Fitmore (104)	Secur-Fit (384)	Fitmore (603)	Pinnacle (534)	Fitmore (578)
10	Interseal (4)	Option (64)	Allofit (351)	Option (449)	Fitmore (520)	Vitalock (569)
% Procedures using Top 10	98.1%	87.9%	87.7%	86.8%	85.4%	83.9%
Total N Procedures	267	2711	8811	13174	14582	15665
Total N Prosthesis Types	13	27	40	49	51	49

Figure H16: Top 5 Cementless Acetabular components used in Primary Conventional Total Hips

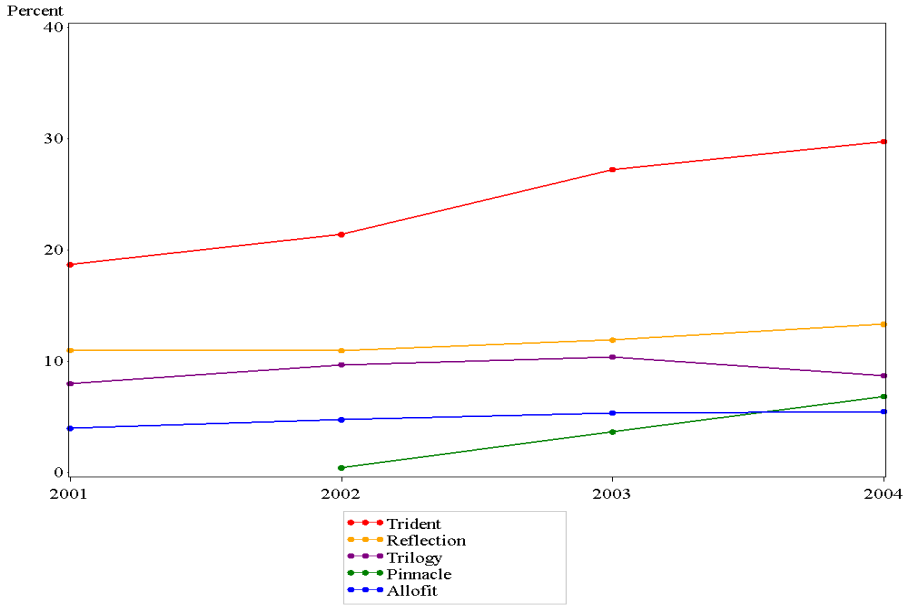


Table H17: Resurfacing hip systems used in Primary Total Hips

Rank	*2000*	*2001*	*2002*	*2003*	*2004*
1	BHR (95)	BHR (643)	BHR (1341)	BHR (1352)	BHR (1209)
2	Conserve (2)	Cormet 2000 (21)	Cormet 2000 (59)	Cormet 2000 (80)	ASR (163)
3	Conserve Plus (1)	Conserve Plus (4)	Conserve Plus (3)	Durom (58)	Durom (162)
4				ASR (43)	Cormet 2000 (87)
5				Conserve Plus (7)	Recap (26)
6					Conserve Plus (18)
7					Icon (4)
8					Conserve (1)
Total N Procedures	98	668	1403	1540	1670
Total N Prosthesis Types	3	3	3	5	8

Prosthesis Fixation and Usage for Hip Replacement

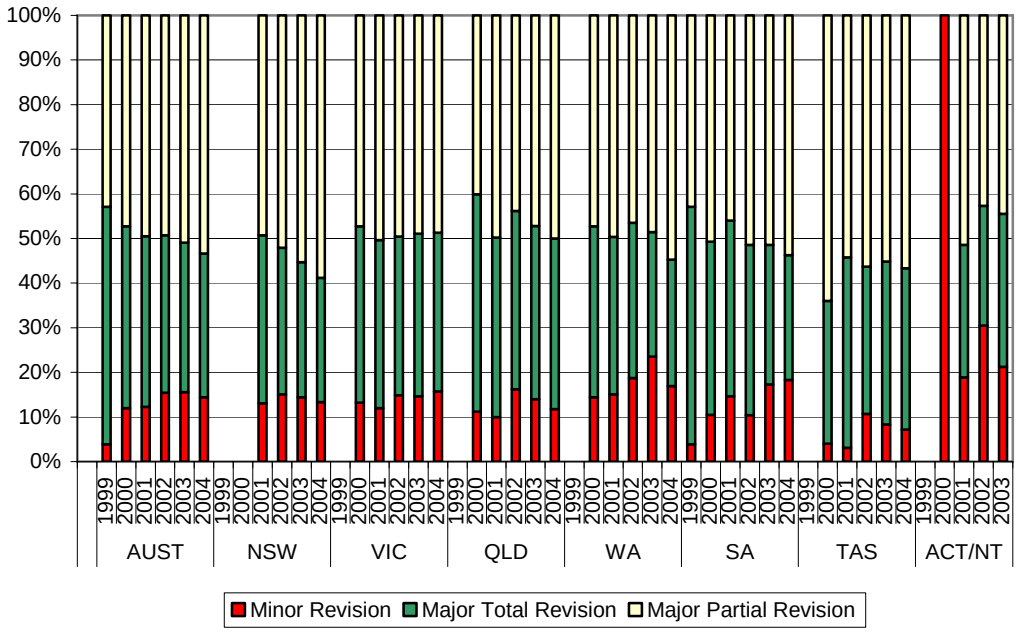
Revision Hip Replacement

Table H18: Prosthesis Fixation - Major Revision Hip Replacement

Component Used	*Cementless*		*Cemented*		*Hybrid*		*N/A*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Femoral Component Only*	1636	14.7	708	6.4	.	.	.	.	2344	21.1
Acetabular Component Only*	2904	26.2	1248	11.2	.	.	.	.	4152	37.4
Femoral and Acetabular	2057	18.5	881	7.9	1231	11.1	.	.	4169	37.6
Reinsertion of Components	14	0.1	3	0.0	.	.	.	.	17	0.2
Prosthesis not reinserted	.	.	.	.	.	.	419	3.8	419	3.8
Total	**6611**	**59.6**	**2840**	**25.6**	**1231**	**11.1**	**419**	**3.8**	**11101**	**100.0**

Note: *N/A means not applicable,*
. *no hip component was used.* * *Major partial revision. All others are Major total.*

Figure H17: Trends in Usage for Revision Hip Replacement by State and Territory



Bilateral Hip Replacement

1/9/1999 to 31/12/2004

Table H19: Days between procedures for Bilateral Primary Hips

1st Procedure	*2nd Procedure*	*Days between Bilateral Procedures*										*Total*	
		Same Day		*<2 weeks*		*2-6 weeks*		*6 weeks - 6 months*		*>6 months*			
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Bipolar	Bipolar	.	.	2	0.0	4	0.1	13	0.2	30	0.5	49	0.8
	Unipolar Mono	.	.	.	.	1	0.0	8	0.1	16	0.2	25	0.4
	Unipolar Modular	.	.	.	.	.	.	.	.	4	0.1	4	0.1
	Total Hip	1	0.0	.	.	1	0.0	7	0.1	17	0.3	26	0.4
Unipolar Mono	Bipolar	.	.	.	.	1	0.0	3	0.0	7	0.1	11	0.2
	Unipolar Mono	4	0.1	6	0.1	12	0.2	60	0.9	97	1.5	179	2.8
	Unipolar Modular	.	.	.	.	.	.	10	0.2	7	0.1	17	0.3
	Total Hip	.	.	.	.	.	.	5	0.1	5	0.1	10	0.2
Unipolar Modular	Bipolar	.	.	.	.	.	.	5	0.1	2	0.0	7	0.1
	Unipolar Mono	.	.	.	.	1	0.0	4	0.1	6	0.1	11	0.2
	Unipolar Modular	2	0.0	1	0.0	2	0.0	11	0.2	15	0.2	31	0.5
	Total Hip	.	.	.	.	.	.	2	0.0	4	0.1	6	0.1
Resurfacing	Resurfacing	123	1.9	18	0.3	3	0.0	133	2.0	252	3.9	529	8.2
	Total Hip	2	0.0	.	.	.	.	4	0.1	22	0.3	28	0.4
Thrust Plate	Thrust Plate	.	.	.	.	.	.	4	0.1	13	0.2	17	0.3
	Total Hip	.	.	.	.	.	.	.	.	1	0.0	1	0.0
Total Hip	Bipolar	1	0.0	1	0.0	1	0.0	6	0.1	23	0.4	32	0.5
	Unipolar Mono	.	.	.	.	1	0.0	3	0.0	12	0.2	16	0.2
	Unipolar Modular	.	.	.	.	.	.	2	0.0	4	0.1	6	0.1
	Resurfacing	2	0.0	1	0.0	.	.	1	0.0	29	0.4	33	0.5
	Total Hip	271	4.2	55	0.8	56	0.9	1712	26.4	3356	51.7	5450	84.0
Total		**406**	**6.3**	**84**	**1.3**	**83**	**1.3**	**1993**	**30.7**	**3922**	**60.5**	**6488**	**100.0**

Table H20: Revision Rates by type of Primary Hip Replacement

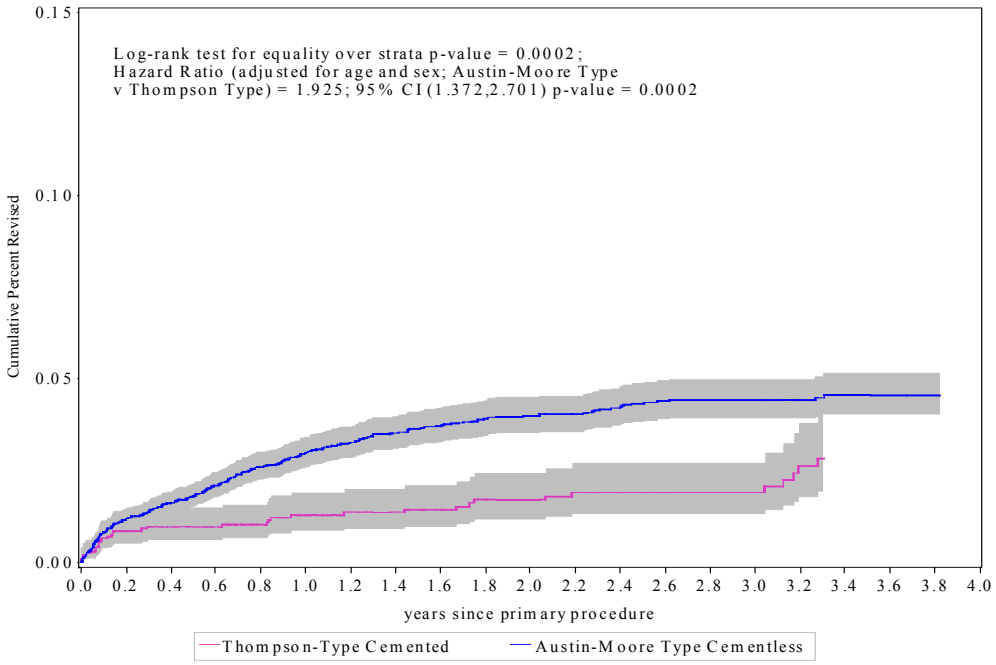
Type of hip replacement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Partial Hip Replacement	483	17330	2.8	33886	1.4	(1.30, 1.56)
Unipolar Monoblock	*333*	*10302*	*3.2*	*21100*	*1.6*	*(1.41, 1.76)*
Unipolar Modular	*46*	*2286*	*2.0*	*4055*	*1.1*	*(0.83, 1.51)*
Bipolar	*104*	*4742*	*2.2*	*8731*	*1.2*	*(0.97, 1.44)*
Conventional Total Hip	1275	65992	1.9	128708	1.0	(0.94, 1.05)
Cemented Total	*172*	*10566*	*1.6*	*24002*	*0.7*	*(0.61, 0.83)*
Cementless Total	*660*	*32084*	*2.1*	*57753*	*1.1*	*(1.06, 1.23)*
Hybrid	*443*	*23342*	*1.9*	*46953*	*0.9*	*(0.86, 1.04)*
Resurfacing Hip	118	5379	2.2	9118	1.3	(1.07, 1.55)
Thrust Plates	2	112	1.8	263	0.8	(0.09, 2.74)
Total	**1878**	**88813**	**2.1**	**171975**	**1.1**	**(1.04, 1.14)**

Table H21: 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	2	180	1.1	265	0.8	(0.09, 2.72)
Austin-Moore Type Cementless	282	7826	3.6	16106	1.8	(1.55, 1.97)
ETS Cemented	0	40	0.0	12	0.0	(0.00, 31.26)
Thompson Type Cemented	38	2027	1.9	4238	0.9	(0.63, 1.23)
Thompson Type Cementless	11	229	4.8	480	2.3	(1.14, 4.10)
Total	**333**	**10302**[†]	**3.2**	**21100**	**1.6**	**(1.41, 1.76)**

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

Figure H18: Cumulative percentage of Revision of Austin Moore and Thompson Hip Prostheses



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Austin-Moore Type Cementless	7826	6819	5801	4808	3892	2885	2007	1197	594
Thompson Type Cemented	2027	1724	1447	1220	1002	803	601	408	221

Table H22: 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)	2	138	1.4	115	1.7	(0.21, 6.31)
Alloclassic SL	Unipolar Head (Sulzer)	6	140	4.3	276	2.2	(0.80, 4.73)
CCA	Hemi Head (Mathys)	4	201	2.0	566	0.7	(0.19, 1.81)
CPT	Unipolar (Zimmer)	4	138	2.9	407	1.0	(0.27, 2.51)
CPT	VerSys Endo	2	133	1.5	113	1.8	(0.21, 6.40)
Elite Plus	Hemi Head (Depuy)	0	62	0.0	104	0.0	(0.00, 3.54)
Exeter	Unitrax	9	511	1.8	755	1.2	(0.54, 2.26)
Fullfix Stem	Hemi Head (Mathys)	1	151	0.7	190	0.5	(0.01, 2.94)
SL-Plus	Unipolar (Endoprothetik)	2	101	2.0	86	2.3	(0.28, 8.35)
Spectron EF	Unipolar Head (S&N)	7	331	2.1	567	1.2	(0.50, 2.54)
Thompson Modular	Ultima	1	124	0.8	393	0.3	(0.01, 1.42)
Other (38)	-	8	256	3.1	482	1.7	(0.72, 3.27)
Total		**46**	**2286**[†]	**2.0**	**4055**	**1.1**	**(0.83, 1.51)**

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

Table H23: 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	3	86	3.5	116	2.6	(0.53, 7.55)
Alloclassic	Bipolar Ballhead (Sulzer)	1	134	0.7	128	0.8	(0.02, 4.35)
Alloclassic SL	Bipolar Ballhead (Sulzer)	3	77	3.9	152	2.0	(0.41, 5.77)
C-Stem	Endo Cup (Depuy)	1	84	1.2	96	1.0	(0.03, 5.79)
C-Stem	Hastings	4	114	3.5	256	1.6	(0.43, 4.00)
CCA	Bipolar Head (Mathys)	1	69	1.4	133	0.8	(0.02, 4.20)
CPCS	Convene	2	224	0.9	213	0.9	(0.11, 3.40)
Charnley	Hastings	0	51	0.0	104	0.0	(0.00, 3.55)
Corail	Hastings	1	53	1.9	55	1.8	(0.05, 10.17)
Elite Plus	Endo Cup (Depuy)	0	173	0.0	281	0.0	(0.00, 1.31)
Elite Plus	Hastings	4	258	1.6	636	0.6	(0.17, 1.61)
Exeter	Centrax	5	266	1.9	999	0.5	(0.16, 1.17)
Exeter	UHR	36	1870	1.9	3184	1.1	(0.79, 1.57)
Omnifit	UHR	11	244	4.5	543	2.0	(1.01, 3.62)
Spectron EF	Convene	4	150	2.7	370	1.1	(0.29, 2.77)
VerSys	Multipolar Bipolar	0	100	0.0	103	0.0	(0.00, 3.60)
Other (120)	-	28	789	3.5	1363	2.1	(1.37, 2.97)
Total	**-**	**104**	**4742**[†]	**2.2**	**8731**	**1.2**	**(0.97, 1.44)**

Note: [†]*total number equals total primary bipolar procedures*

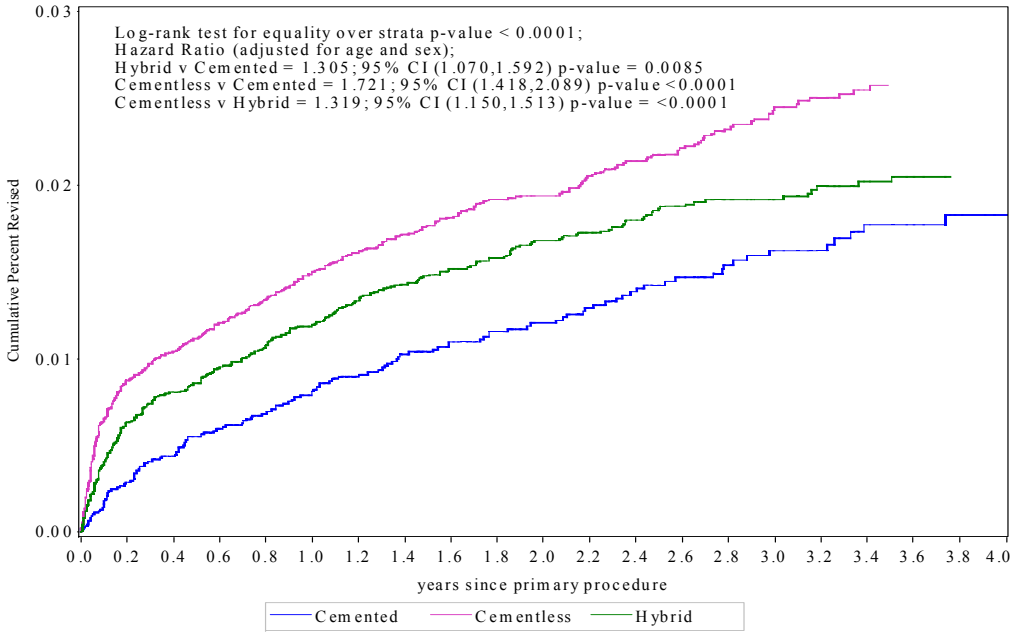
Table H24: Revision rates for Bipolar Type (Biomet) and Other Bipolar Components

Bipolar	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Bipolar Type (Biomet)	6	64	9.4	94	6.41	(2.35, 13.94)
Other Bipolar	98	4678	2.1	8637	1.13	(0.92, 1.38)
All Bipolar	**104**	**4742**	**2.2**	**8731**	**1.19**	**(0.97, 1.44)**

Table H25: Primary Conventional Total Procedures for Osteoarthritis requiring revision by cement status excluding infection

Cement Used	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	134	10528	1.3	23968	0.6	(0.47, 0.66)
Cementless	587	32011	1.8	57700	1.0	(0.94, 1.10)
Hybrid	359	23258	1.5	46884	0.8	(0.69, 0.85)
Total	**1080**	**65797**	**1.6**	**128551**	**0.8**	**(0.79, 0.89)**

Figure H19: Cumulative percentage of Revision for Total Hip Replacement by cement status excluding infection



	Number at risk at start of the period								
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*
Cemented	10528	9427	8318	7211	5949	4691	3398	2152	1067
Cementless	32011	26797	21920	17586	13302	9427	5879	3135	1367
Hybrid	23258	20166	17113	14258	11246	8453	5659	3357	1537

Table H26: Primary Conventional Total where the Femoral and Acetabular components were Cemented 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	Charnley	9	202	4.5	573	1.6	(0.72, 2.98)
	Charnley Ogee	2	159	1.3	346	0.6	(0.07, 2.09)
	Elite Plus LPW	1	248	0.4	449	0.2	(0.01, 1.24)
	Elite Plus Ogee	0	174	0.0	363	0.0	(0.00, 1.02)
CPCS	Reflection	5	250	2.0	339	1.5	(0.48, 3.44)
CPT	ZCA	4	343	1.2	810	0.5	(0.13, 1.26)
Charnley	Charnley	5	302	1.7	764	0.7	(0.21, 1.53)
	Charnley LPW	7	200	3.5	635	1.1	(0.44, 2.27)
	Charnley Ogee	8	481	1.7	1086	0.7	(0.32, 1.45)
Elite Plus	Charnley Ogee	3	257	1.2	603	0.5	(0.10, 1.45)
	Elite Plus Ogee	1	117	0.9	365	0.3	(0.01, 1.53)
Exeter	CCB	3	109	2.8	196	1.5	(0.31, 4.46)
	Contemporary	56	2788	2.0	5523	1.0	(0.77, 1.32)
	Elite Plus Ogee	3	238	1.3	514	0.6	(0.12, 1.71)
Exeter	Exeter	19	1378	1.4	3445	0.6	(0.33, 0.86)
MS 30	Apollo	2	113	1.8	261	0.8	(0.09, 2.77)
	Low Profile Cup	2	500	0.4	1390	0.1	(0.02, 0.52)
Omnifit	Contemporary	2	133	1.5	317	0.6	(0.08, 2.28)
	Omnifit	2	116	1.7	459	0.4	(0.05, 1.58)
Spectron EF	Reflection	9	880	1.0	2043	0.4	(0.20, 0.84)
Other (152)	-	29	1578	1.8	3520	0.8	(0.55, 1.18)
Total	**-**	**172**	**10566**	**1.6**	**24002**	**0.7**	**(0.61, 0.83)**

Note: *femoral model name not repeated but continues down the column until change of model name some cementless components have been cemented*

Table H27: Primary Conventional Total where the Femoral and Acetabular components were Cemented requiring Revision.
Least revised over 1000 observed component years

Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
MS 30	Low Profile Cup	2	500	0.4	1390	0.1	(0.02, 0.52)
Spectron EF	Reflection	9	880	1.0	2043	0.4	(0.20, 0.84)
Exeter	Exeter	19	1378	1.4	3445	0.6	(0.33, 0.86)
Charnley	Charnley Ogee	8	481	1.7	1086	0.7	(0.32, 1.45)
Exeter	Contemporary	56	2788	2.0	5523	1	(0.77, 1.32)

Table H28: Primary Conventional Total where the Femoral and Acetabular components were Cementless 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	49	2049	2.4	4196	1.2	(0.86, 1.54)
	ABGII (shell/insert)	5	389	1.3	456	1.1	(0.36, 2.56)
	Option	3	194	1.5	286	1.0	(0.22, 3.07)
	Trident	15	685	2.2	1032	1.5	(0.81, 2.40)
Accolade	Trident	19	957	2.0	1074	1.8	(1.06, 2.76)
Alloclassic	Allofit	12	632	1.9	492	2.4	(1.26, 4.26)
	Fitmore	8	349	2.3	299	2.7	(1.16, 5.28)
Alloclassic SL	Allofit	12	891	1.3	2025	0.6	(0.31, 1.04)
	Fitmore	5	433	1.2	1013	0.5	(0.16, 1.15)
	Morscher	6	292	2.1	743	0.8	(0.30, 1.76)
CBC Stem	CBF Cup	4	194	2.1	496	0.8	(0.22, 2.06)
CLS	Allofit	5	300	1.7	501	1.0	(0.32, 2.33)
	CLS	1	158	0.6	572	0.2	(0.00, 0.97)
	Fitmore	9	358	2.5	813	1.1	(0.51, 2.10)
Citation	Trident	7	347	2.0	543	1.3	(0.52, 2.66)
	Vitalock	7	491	1.4	1116	0.6	(0.25, 1.29)
Corail	Duraloc	7	501	1.4	826	0.8	(0.34, 1.75)
	Option	3	236	1.3	514	0.6	(0.12, 1.70)
	Pinnacle	5	409	1.2	283	1.8	(0.57, 4.12)
Epoch	Trilogy	4	206	1.9	265	1.5	(0.41, 3.87)
F2L Multineck	SPH-Blind	20	576	3.5	1119	1.8	(1.09, 2.76)
Mallory-Head	M2a	2	181	1.1	143	1.4	(0.17, 5.05)
	Mallory-Head	18	1172	1.5	2853	0.6	(0.37, 1.00)
Margron	Transcend	13	219	5.9	493	2.6	(1.41, 4.51)
Meridian	Vitalock	7	346	2.0	727	1.0	(0.39, 1.98)
Natural Hip	Allofit	2	158	1.3	292	0.7	(0.08, 2.47)
	Fitmore	9	563	1.6	1116	0.8	(0.37, 1.53)
Omnifit	Secur-Fit	20	472	4.2	1094	1.8	(1.12, 2.82)
	Trident	13	732	1.8	1689	0.8	(0.41, 1.32)
S-Rom	Option	8	587	1.4	1183	0.7	(0.29, 1.33)
	Pinnacle	3	367	0.8	366	0.8	(0.17, 2.39)
	S-Rom	2	156	1.3	470	0.4	(0.05, 1.54)
SL-Plus	EPF-Plus	3	242	1.2	199	1.5	(0.31, 4.41)
Secur-Fit	Trident	34	1578	2.2	2953	1.2	(0.80, 1.61)
Secur-Fit Plus	Trident	38	2354	1.6	4282	0.9	(0.63, 1.22)
Stability	Duraloc	4	389	1.0	868	0.5	(0.13, 1.18)
Summit	Pinnacle	5	512	1.0	442	1.1	(0.37, 2.64)
Synergy	Reflection	72	3384	2.1	5400	1.3	(1.04, 1.68)
Taperloc	M2a	3	207	1.4	206	1.5	(0.30, 4.25)
	Mallory-Head	9	423	2.1	790	1.1	(0.52, 2.16)
VerSys	Trilogy	39	2055	1.9	3558	1.1	(0.78, 1.50)
Other (380)	-	150	5340	2.8	9965	1.5	(1.27, 1.77)
Total	**-**	**660**	**32084**	**2.1**	**57753**	**1.1**	**(1.06, 1.23)**

Note: *femoral model name not repeated but continues down the column until change of model name*

Table H29: Primary Conventional Total where the Femoral and Acetabular components were Cementless requiring Revision
Least Revised over 1000 observed component years

Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Alloclassic SL	Allofit	12	891	1.3	2025	0.6	(0.31, 1.04)
S-Rom	Option	8	587	1.4	1183	0.7	(0.29, 1.33)
Mallory-Head	Mallory-Head	18	1172	1.5	2853	0.6	(0.37, 1.00)
Secur-Fit Plus	Trident	38	2354	1.6	4282	0.9	(0.63, 1.22)
Omnifit	Trident	13	732	1.8	1689	0.8	(0.41, 1.32)

Table H30: Hybrid - Primary Conventional Total Hip where the Femoral component was Cemented and the Acetabular component was Cementless requiring Revision

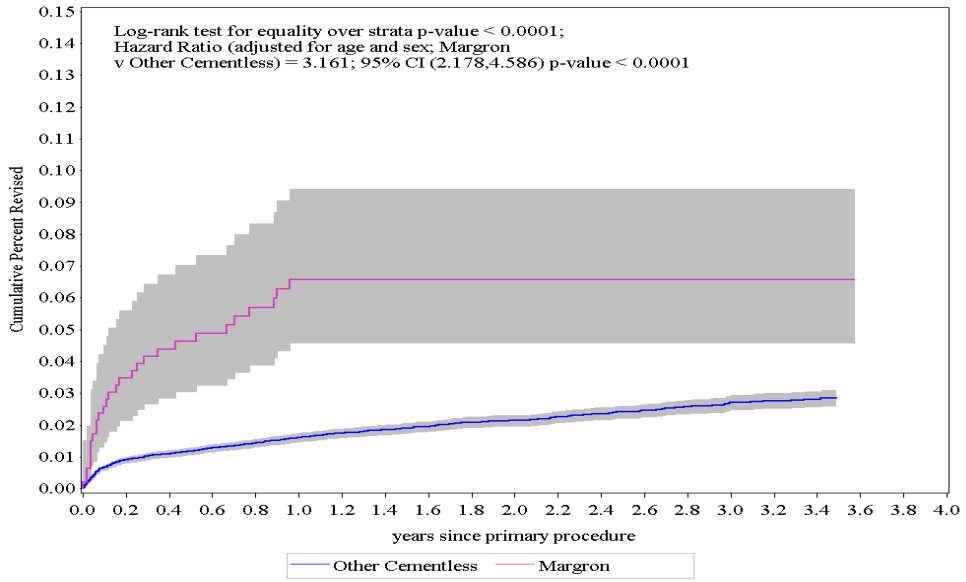
Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
C-Stem	Duraloc	20	635	3.1	1234	1.6	(0.99, 2.50)
	Option	3	104	2.9	160	1.9	(0.39, 5.50)
CPCS	Reflection	7	523	1.3	683	1.0	(0.41, 2.11)
CPT	Trilogy	28	1511	1.9	2874	1.0	(0.65, 1.41)
Charnley	Duraloc	4	159	2.5	395	1.0	(0.28, 2.59)
	Vitalock	9	354	2.5	900	1.0	(0.46, 1.90)
Definition	Trident	4	138	2.9	382	1.0	(0.29, 2.68)
Definition	Vitalock	1	351	0.3	1199	0.1	(0.00, 0.46)
Elite Plus	Duraloc	25	976	2.6	2522	1.0	(0.64, 1.46)
	Mallory-Head	3	125	2.4	378	0.8	(0.16, 2.32)
	Pinnacle	1	184	0.5	150	0.7	(0.02, 3.72)
	Trident	4	174	2.3	333	1.2	(0.33, 3.08)
Exeter	ABGII	12	1022	1.2	2206	0.5	(0.28, 0.95)
	Duraloc	8	293	2.7	698	1.1	(0.49, 2.26)
	Mallory-Head	8	746	1.1	1599	0.5	(0.22, 0.99)
	Reflection	5	157	3.2	339	1.5	(0.48, 3.44)
	Secur-Fit	8	223	3.6	549	1.5	(0.63, 2.87)
	Trident	81	5056	1.6	6787	1.2	(0.95, 1.48)
	Trilogy	5	212	2.4	314	1.6	(0.52, 3.72)
	Vitalock	48	2766	1.7	7370	0.7	(0.48, 0.86)
Freeman	Mallory-Head	8	288	2.8	730	1.1	(0.47, 2.16)
Friendly Hip	SPH-Blind	4	121	3.3	200	2.0	(0.55, 5.12)
Lubinus SP II	C.F.P.	2	168	1.2	311	0.6	(0.08, 2.32)
MS 30	Allofit	8	449	1.8	772	1.0	(0.45, 2.04)
	Fitmore	0	289	0.0	810	0.0	(0.00, 0.46)
Omnifit	Secur-Fit	8	253	3.2	811	1.0	(0.43, 1.94)
	Trident	22	935	2.4	1898	1.2	(0.73, 1.76)
Spectron EF	Reflection	49	2186	2.2	4702	1.0	(0.77, 1.38)
VerSys	Trilogy	5	450	1.1	973	0.5	(0.17, 1.20)
Other (204)	-	47	2278	2.1	4255	1.1	(0.81, 1.47)
Total	**-**	**437**	**23126**	**1.9**	**46531**	**0.9**	**(0.85, 1.03)**

Note: *femoral model name not repeated but continues down the column until change of model name some cementless components have been cemented*

Table H31: Hybrid - Primary Conventional Total Hip where the Femoral component was Cemented and the Acetabular component was Cementless requiring Revision Least revised Combinations over 1000 observed component years

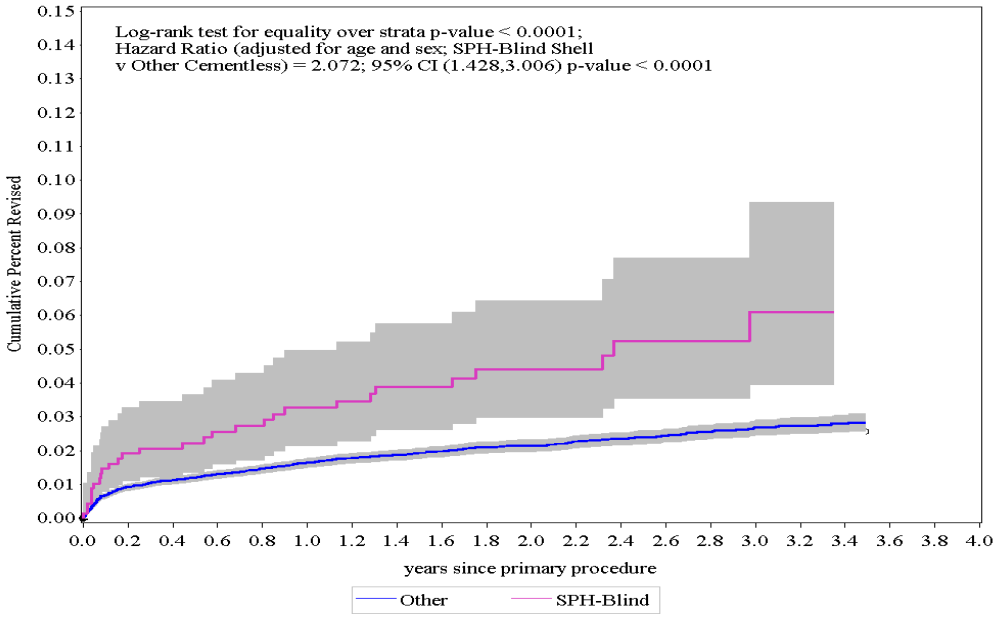
Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Definition	Vitalock	1	351	0.3	1199	0.1	(0.00, 0.46)
Freeman	Mallory-Head	8	746	1.1	1599	0.5	(0.22, 0.99)
Exeter	ABGII	12	1022	1.2	2206	0.5	(0.28, 0.95)
Exeter	Trident	81	5056	1.6	6787	1.2	(0.95, 1.48)
Exeter	Vitalock	48	2766	1.7	7370	0.7	(0.48, 0.86)

Figure H20: Cumulative percentage of Revision of Cementless Margron Hip Prosthesis v Other Cementless Femoral components



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Others	31616	26453	21629	17337	13106	9307	5802	3082	1343
Margron	468	380	310	262	200	122	77	53	24

Figure H21: Cumulative percentage of Revision of Cementless SPH-Blind Hip Prostheses and Other Cementless Acetabular components

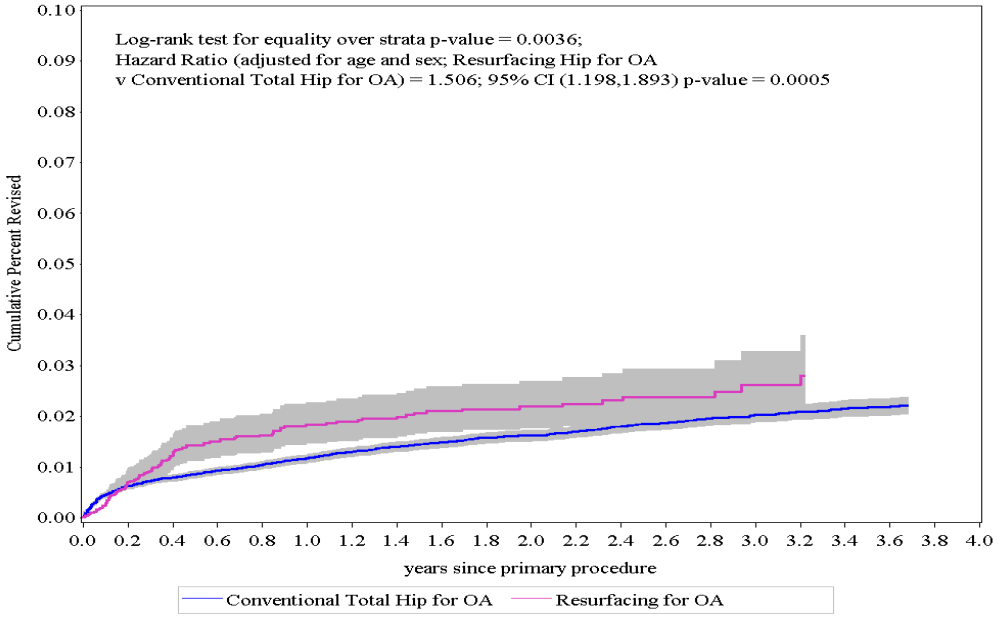


	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Others	31383	26217	21425	17181	13007	9237	5772	3084	1344
SPH-Blind	682	605	513	417	298	191	107	51	23

Table H32: Primary Total Procedures of Conventional Total hip and Resurfacing hip for Osteoarthritis requiring revision 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	98	4974	2.0	8427	1.2	(0.94, 1.42)
Conventional Total	900	57939	1.6	112848	0.8	(0.75, 0.85)
Total	**998**	**62913**	**1.6**	**121275**	**0.8**	**(0.77, 0.88)**

Figure H22: Cumulative percentage of Revision of Conventional Total hip and Resurfacing hip for Osteoarthritis excluding revisions for infection

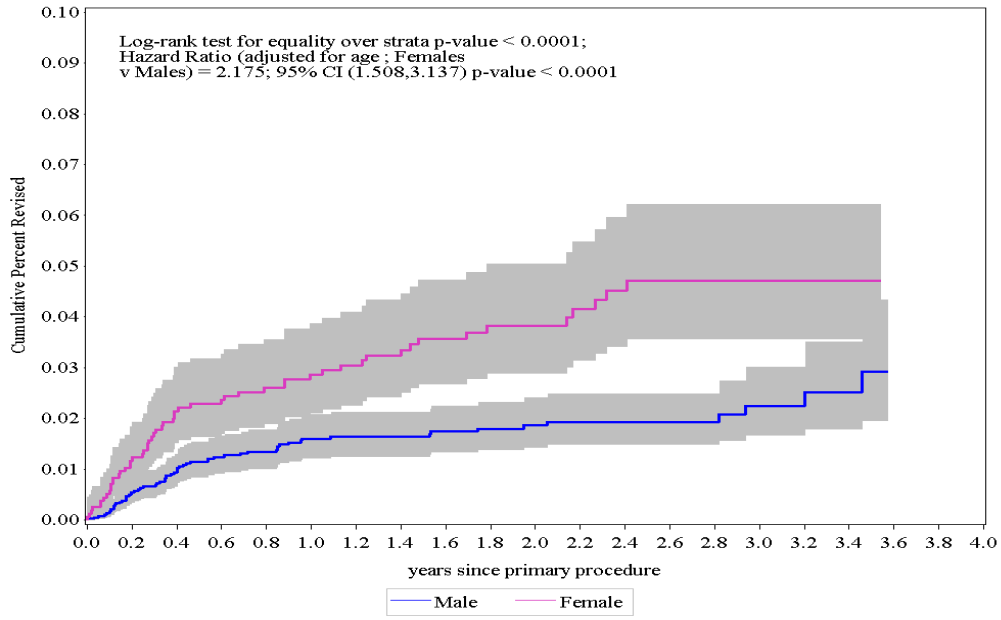


	Number at risk at start of the period								
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*
Resurfacing	4974	4107	3358	2653	1952	1287	706	305	88
Conventional Total	57939	49615	41601	34308	26741	19773	13027	7544	3432

Table H33: Resurfacing Hip systems requiring revision by age and sex

Sex	*Age*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Male	<50	21	1165	1.8	2013	1.04	(0.65, 1.59)
Male	50-54	7	704	1.0	1169	0.60	(0.24, 1.23)
Male	55-59	7	779	0.9	1305	0.54	(0.22, 1.11)
Male	60-64	7	648	1.1	1053	0.66	(0.27, 1.37)
Male	>=65	21	496	4.2	829	2.53	(1.57, 3.87)
Female	<50	16	551	2.9	945	1.69	(0.97, 2.75)
Female	50-54	13	369	3.5	650	2.00	(1.07, 3.42)
Female	55-59	16	402	4.0	693	2.31	(1.32, 3.75)
Female	60-64	8	199	4.0	343	2.33	(1.01, 4.59)
Female	>=65	2	66	3.0	118	1.70	(0.21, 6.13)
Total	**.**	**118**	**5379**	**2.2**	**9118**	**1.29**	**(1.07, 1.55)**

Figure H23: Cumulative percentage of Revision of Resurfacing hip by sex



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Male	3792	3143	2547	2004	1463	953	513	225	66
Female	1587	1313	1090	870	654	434	239	100	29

Table H34: 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	5	206	2.4	111	4.5	(1.46, 10.51)
BHR	BHR	93	4640	2.0	8435	1.1	(0.89, 1.35)
Conserve		2	2	100.0	3	74.1	(8.97, 267.6)
Conserve	Conserve Plus	0	1	0.0	0	0.0	(0.00, 3455)
Conserve Plus	Conserve Plus	1	33	3.0	45	2.2	(0.06, 12.38)
Cormet 2000	Cormet 2000	9	247	3.6	372	2.4	(1.11, 4.59)
Durom	Durom	7	220	3.2	142	4.9	(1.98, 10.13)
Icon	Icon	0	4	0.0	0	0.0	(0.00, 1192)
Recap	Recap	1	26	3.8	9	11.5	(0.29, 64.06)
Total	**-**	**118**	**5379**	**2.2**	**9118**	**1.29**	**(0.85, 1.03)**

AOA National Joint Replacement Registry
Knee Replacement Data

Data presented in this report are for the period 1/09/1999-31/12/2004 and involved the analysis of 105,723 knee procedures. This is an additional 29,496 knee procedures compared to last year's annual Report.

Demographics and Diagnosis

The Registry categorises knee replacement procedures as unispacer, patella/trochlear, unicompartmental, primary total and revision procedures. The proportion of each of the knee procedures during the entire data collection period are: unispacer (0.03%); patella/trochlear (0.5%); unicompartmental (13.7%); primary total (77.1%) and revision procedures (8.7%) (Table K1). These figures are similar to those previously reported with the exception of unicompartmental knee replacement where the proportion has decreased from 14.2% to 13.7% since last year's Report. Primary total knee replacement has increased from 76.7% to 77.1%. There are variations in the use of the different categories of knee procedures between the states and territories. Figure K1 compares trends and variation in use of unicompartmental knee replacement, primary total knee and revision procedures by state and territory.

Gender and age distribution also remains similar. Previously the Registry has published tables and graphs specifying gender and age distribution for each of the different knee procedures. For the sake of brevity they have not been included in this report but have been summarised (Tables K1 and K2). However the detailed tables and graphs that relate to this report are available at the Registry website.

The Registry has also reduced the information on principal diagnosis specific to each of the knee procedures. As with gender and age the Registry has not included these tables in this report however they are available at the Registry website.

There has been very little change in the principal diagnosis related to each of the procedures with osteoarthritis remaining the most common reason for Unispacer knee procedures (100%), Patella/Trochlear (98.8%), unicompartmental (98.6%) and primary total knee replacement (96.4%). The principal cause for revision knee surgery is loosening (37.7%).

Prosthesis Usage and Fixation for Primary Knee Replacement Procedures

Unispacer

The Registry has received reports on this recently available 'minimal' prosthesis. It remains unclear at this early stage to what extent surgeons are reporting its use. The Registry regards it as a form of joint replacement and as such believes it should be reported. Currently the Registry has details on 36 procedures. Two different types of prosthesis were used during 2004. They are the Zimmer unispacer and the InterCushion prosthesis (Table K3).

Patella/trochlear

Although this is not a common procedure the Registry is accumulating a significant number of cases. As of the 31st December 2004, 494 patellar/trochlear procedures were reported to the Registry. Apart from one custom made trochlear component six different trochlear components have been used. The frequency of use of these components is presented in Table K4. A variety of different patella components have been used in association with the trochlear components and on occasion there has been no patella component used. The Registry is aware that at least for some of these cases, a patellectomy had previously been undertaken.

Unicompartmental

The use of unicompartmental knee replacement has declined in Australia during the last year. There has been an 11% reduction in the number of procedures performed during 2004 compared to 2003 (Table K6).

Cement fixation is used for the vast majority of these procedures with both components being cemented in over 90% of cases (Table K5). There is however a higher rate of cementless fixation in Victoria compared to the other states and territories with approximately 25% of unicompartmental knee replacements in Victoria being performed in this manner (Figure K2).

Table K6 lists the ten most frequently used prostheses for each of the years that that the Registry has collected data. During 2004 there were fifteen different prostheses used. This is an increase of one compared to 2003. The Oxford unicompartmental knee replacement is the most used prosthesis however there has been a continual decline in the proportional use of this prosthesis since 2001 and a decrease in absolute numbers each year for the last two years (Table K6 and Figure K3).

Primary total knee replacement

Both the femoral and tibial components are cemented in almost half of all primary total knee replacements. The tibial component only is cemented in a further 27.1% of cases (Table K7).

There are variations in the method of fixation between the states and territories with Queensland having the highest proportion of cement fixation and Tasmania, the highest proportion of cementless fixation (Figure K4).

In Australia the majority of primary knee replacements do not have a patella prosthesis inserted. When it is used it is almost always cemented (Table K7). There is considerable regional variation in the use of a patella with South Australia and Tasmania not using a patella in over 80% of primary total knees. This contrasts with the national average of 57.2% (Figure K5).

The most common primary total knee replacement used in Australia during 2004 was the LCS. It has been the most used prosthesis every year since data collection commenced. It was used in 15.1% of all primary total knee procedures during 2004. This is a decrease from its peak of 19.4% in 2001 (Table K8, Figure K6). Currently the ten most commonly used prostheses are used in 87% of all primary total knee replacements. The number of different types of prostheses being used has declined from a high of 51 in 2002 to 45 in 2004 (Table K8, Figure K6).

The LCS is used as a cementless, cemented and hybrid prosthesis. It is the most common cementless primary total knee replacement, the fifth most common cemented prosthesis and the third most common hybrid. The most common cemented prosthesis in 2004 was the Genesis II and the Duracon was the most commonly used Hybrid. Details of the ten most common cementless, cemented and hybrid prosthesis are presented in (Tables K9, K10 and K11 and Figures K7, K8 and K9).

Prosthesis Usage and Fixation for Revision Knee Replacement

Analysis has been undertaken on 9,164 knee revision procedures. The Registry collects data on all revision procedures performed regardless of whether the primary is registered.

The Registry classifies revisions as major or minor. A major revision involves the removal and/or replacement of a major component. This is defined (with the exception of the patella) as a component that interfaces with bone i.e. either the femoral and/or tibial component. A minor revision is a revision where a major component has not been removed or replaced. Examples of this include, patella replacement, tibial insert exchange, or both.

A Major revision is the most common type of revision undertaken. The most common major revision is replacement with both tibial and femoral total knee components. When this occurs only a small number of procedures use cementless fixation for both components (6.6%). Minor revisions account for 32.9% of the knee revisions (Table K12 and Figure K10).

Figure K10 presents the changing trends in the type of knee revision procedures being undertaken by state and territory. The

Registry has sub-classified major revisions into major total revision and major partial revision. A major total revision is when both the femoral and tibial components are removed. A major partial revision is when only one of the major components is removed. Nationally there has been a decrease in the number of minor revisions and an increase in the number of major partial revisions (Figure K10). The reason for this change has not yet been determined.

Bilateral Primary Knee Replacement

The number of patients that have had bilateral primary knee replacements recorded by the Registry has increased from 8,383 to 13,086 (56.1%) since last year's Report. This increase mainly relates to patients receiving a second knee replacement in the period 6 month or longer after the initial operation. This number has increased from 3,648 to 6,453 (76.9%). This change is almost certainly a reflection of the time that the Registry has been collecting data. Patients who have previously received a knee replacement have had more time for a further primary procedure to be performed on the opposite side. There has been no change in the rate of same day bilateral procedures being undertaken (Table K13).

Early Outcomes of Primary Knee Replacements procedures

Data in this section are based on analysis of revisions of known primary procedures. A known primary procedure is one that has been recorded by the Registry and has a procedure date during the period 1st September 1999 to 31st December 2004.

Revision is the major end point the Registry uses to identify failure. As data collection commenced in 1999 and only became fully national in mid 2002, the outcomes presented in this section are all early revisions. In last year's Report the Registry detailed the analysis of 1,203 revisions of 69,485 known primary procedures. A further 955 revisions of known primary procedures were reported in 2004. This brings the total to 2,158 revisions of the 96,559 known primary knee replacements.

As mentioned in previous reports the proportion of revision procedures where the Registry already knows the primary procedure will increase with each additional year of data collection. In last year's Report this figure was 18.3%, it has now increased to 23.5%.

General Comments

Over the last year the number of primary knee replacements recorded by the Registry that have subsequently been revised increased from 1.7% to 2.2%. The number of revisions per 100 observed component years has remained constant at 1.2% (Table K14).

As would be anticipated there are variations in outcome depending on the category of primary knee replacement performed. The least revised prostheses are primary total knees with 1.0 revision per 100 observed component years. Unicompartmental knee replacements have 2.2 revisions per 100 observed component years, patella/trochlear 2.3 and unispacers 45.1 (Table K14).

Comparing unicompartmental knee replacements and primary total knees undertaken for the diagnosis of osteoarthritis there is a significant difference in the age and sex adjusted rate of early revision (unicompartmental knee replacements (6.3%), total knee (2.8%), (Hazard Ratio = 1.902; 95% CI (1.726, 2.096), P <0.0001) (Figure K11).

Even though there is a reduced revision rate with increasing age for primary unicompartmental knee replacement this rate is still greater than the revision rate for primary total knee replacement in the same age group.

Unispacer

Although the Registry only has information on a small number of unispacer procedures the current early revision rate is cause for concern. There were thirteen procedures listed in last year's annual Report. At that time there were no revisions. During 2004 a further 23 procedures were reported. In addition however 12 revisions of the 36 primaries were also reported. The percentage revised is now 33% with most

being revised within 12 months of the initial surgery. The number of revisions per 100 observed component years is 45.1 (Table K15).

Unispacer prosthesis: Individual specific revision rates

Only two prostheses have been used in this category of knee replacement. Nine InterCushion prostheses have been used. There has been one revision reported to the Registry prior to the 31st of December 2004. There have been 11 revisions of the 27 Zimmer unispacer procedures. The percentage revised is 40.7% and there are 50.0 revisions per 100 observed component years (Table K15).

These results were provided to Zimmer and the Registry received the following response from the company. "Since the merger with Centerpulse, Zimmer has redefined the Surgical technique and the Surgeon training program for the unispacer. With these refinements, the designer of the unispacer, Rick Hallock, has seen his 1 year revision rates for any reason decline from 32.9% to 17.9%. Locally, following low sales, Zimmer made a commercial decision to discontinue thesupply of this product in 2005".

Patellar/Trochlear replacements

There have been 19 revisions (3.8%) with 2.3 revisions per 100 observed component years for the 494 Patella/Trochlear procedures recorded by the Registry. This is currently a similar rate of revision to unicompartmental knee replacement (Table K14).

Patella/trochlear prosthesis: Individual prostheses specific revision rates.

The revision rates for each of the prostheses have been presented in Table K16. The numbers for the individual prosthesis do not allow for a statistically relevant comparison of revision rates at this time.

Unicompartmental knee replacement

Although unicompartmental knee replacement is traditionally thought of as a procedure for the younger population there is a significant number of procedures performed on older individuals 33.0% (65-74 years), 20.5% (75-84 years) and 1.7% (≥ 85 years).

We have examined the revision rates looking at the effects of age and gender to compare the outcomes of the older group. There is a significant difference between those patients under 65 yrs compared to those older than 65 with those under 65 having a significantly higher rate of revision (Hazard Ratio (adjusted for sex) < 65 v ≥ 65 = 1.761; 95%CI (1.499,2.068) P<0.0001) (Table K17 and Figure K12).

Additionally the revision rate declines with increasing age. This difference is evident for both males and females however the influence of age is greatest in males. Younger males have a higher revision rate compared to younger females (males<50 yrs (8.2%, 4.58 per 100 component years and males 50-54 (8.0%, 4.36 per 100 component years) (females <50 is 7.7% (4.09 per 100 component years), and females 50-54, 6.5% (3.46 per 100 component years). Older males however have lower revision rates compared to older females (males ≥ 65, 2.9%, females ≥ 65, 3.7%. The overall percentage revision for females is 4.6% compared to males, 3.9%.

Unicompartmental prostheses: Individual prosthesis specific revision rates

When determining the revision rates for specific knee prosthesis, unicompartmental prostheses have a higher proportion of individual prostheses that have a greater than anticipated revision rate. This presents specific problems for the Registry when undertaking the analysis of these prostheses. This issue was discussed in last years report. At that time it was decided to compare a single prostheses to the combined revision rate of the three prostheses known to have the lowest revision rates and each having greater than 1,000 observed component years. This year the same approach has been used. The comparator prostheses remain the same as last year and they are the M/G, Repicci and Unix unicompartmental knee replacements. Revisions for the individual comparator prostheses are detailed in Table K18.

Revision rates for the 12 most frequently used prostheses are presented in (Table K19). Five of these prostheses have been identified as having a statistically significant higher rate of revision when compared to the comparator prostheses.

The five prostheses are:

1. Allegretto
2. Natural unicompartmental knee
3. Oxford
4. Preservation-Fixed
5. Preservation-Mobile.

The cumulative percentage of revisions of these five unicompartmental knee replacements compared to the comparators is shown in Figure K13.

Allegretto unicompartmental knee

The Allegretto unicompartmental knee replacement continues to have a statistically significant higher revision rate compared to the comparator prostheses (MG, Repicci and Unix) (Hazard Ratio adjusted for age and sex, Allegretto v Other (MG, Repicci and Unix)=1.618; 95% CI (1.197,2.188) P=0.0018) (Figure K14).

The results presented in this report are based on the 1,238 Allegretto procedures recorded in the Registry to the end of 2004, an increase of 186 on the number reported last year. In the 2004 Report it was mentioned that the rate of use of the Allegretto has progressively declined since the Registry first reported the higher than anticipated revision rate in the 2002 annual Report. This reduction continued in 2004 with a decrease from 8.3% of all unicompartmental knees in 2003 to 5.0% in 2004 (Table K6).

The overall incidence of revision is 5.4%. There have been 2.5 revisions per 100 observed component years compared to 1.5 for the comparators. The percentage revised for the Allegretto at one year is 3.3% and at three years is 6.1%. The comparator prostheses have a revision percentage at one year of 1.5% and at three years, of 4.5%. (Table K19 and Figure K14).

These results were provided to Zimmer and the company made the following comments: "Following the integration of Zimmer and Centerpulse, Zimmer has recognised that the results of the Allegretto unicompartmental prostheses are highly dependent on the cementing technique for the tibial component. A refined surgical technique procedure has been issued, and work is currently underway to modify the tibial component for enhanced cement fixation".

Natural unicompartmental knee

For the first time the Registry reports that the Natural unicompartmental knee replacement has a higher revision rate than the comparator prostheses (Hazard Ratio adjusted for age and sex, Natural unicompartmental v Other (MG, Repicci and Unix)= 3.225; 95% CI (1.876,5.544) P<0.0001) (Figure K15).

The Registry has recorded only 139 procedures using this prosthesis and its use has been limited to a small number of centres. The overall incidence of revision is 10.8%. There have been 5.1 revisions per 100 observed component years compared to 1.5 for the comparators. The percentage revision for the Natural unicompartmental knee replacement at one year is 6.1% and at three years is 13%. The comparator prostheses have a percentage revision at one year of 1.5% and at three years, of 4.5%. (Table K19 and Figure K15).

These data were provided to Zimmer and the company made the following comments: “Zimmer is currently conducting a review of the loosening rates of the Natural unicompartmental knee at a number of identified centres. These centres represent 60% of the failures. Surgeons who have previously used this implant have changed to other implants, and this component is no longer used by Australian surgeons".

Oxford 3 unicompartmental knee

The Oxford 3 unicompartmental knee is the most commonly used unicompartmental knee replacement in Australia. This has been the case since the Registry first commenced data collection in 1999. In 2004 it accounted for 31.2% of all unicompartmental knee prostheses inserted

(Table K6). This proportion however has steadily reduced from 45.0% in 2001. For this report the Registry has information on 5,471 primary Oxford 3 unicompartmental procedures. Of these 265 have been revised during the observed time period. Of all Oxford 3 primary unicompartmental knees 4.8% have required revision (compared to 2.9% for the comparators). There have been 2.3 revisions per 100 observed component year (compared to 1.5 for the comparators). The percentage revised at one year is 2.2% and at three years is 6.9%. The comparator prostheses have a percentage revision at one year of 1.5% and at three years it is 4.5%. (Hazard Ratio (adjusted for age and sex) Oxford 3 v Others M/G, Repicci, Unix) = 1.562; 95% CI (1.256, 1.942), P <0.0001) (Table K19 and Figure K16).

Multiple diagnoses have been provided as the reasons for revision but the major one is loosening. This and the remaining causes for revision occur in a similar proportion to the comparator prostheses but at a higher rate. Insert dislocation is a problem that has been previously identified with this prosthesis but the Registry figures indicate that the incidence of this is low with 14 patients requiring revision for this diagnosis. It is possible however that this has been underestimated as some cases of tibial insert dislocation may have potentially been classified as loosening.

The Swedish Knee Replacement Registry has previously reported that the outcome of this prosthesis is in part related to the annual number of procedures undertaken by a hospital. The implication was that this may reflect the experience of the surgeon undertaking the procedure **(**Robertsson *et al* (J. Bone Joint Surgery. (Br) 2001; 83-B: 45-9). We have undertaken a similar analysis of Australia hospitals but have not been able to identify any relationship between the number of procedures performed at hospital and the risk of revision surgery.

The analysis that was undertaken compared the revision rate for hospitals undertaking 23 or less Oxford unicompartmental procedures per year to hospitals doing more than 23 procedures each year. There was no difference in the rate of revision. The percentage revision for hospitals doing less than 23 Oxford's per year was 5.0% and 2.5 revisions per 100 observed component years. The percentage revision for hospitals doing 23 or more per year was 4.7% and 2.2 revisions per 100 observed component years. This difference was not statistically significant.

There could be many reasons why this analysis was not able to confirm the Swedish finding. This approach is in part a surrogate for experience. In the Australian context it is possible that hospitals undertaking smaller numbers of procedures still had experienced surgeons undertaking those procedures. In this country it is usual for surgeons to work at more than one hospital rather than confining their practice to a single hospital. Alternatively some hospitals undertaking larger numbers of procedures may potentially have a number of inexperienced surgeons undertaking the surgery. The analysis demonstrated considerable variation in outcome between hospitals and that some hospitals undertaking large numbers of procedures had the highest revision rates with this prostheses. The only way to conclusively establish that experience is directly related to risk of revision using Australian data is to perform surgeon specific analysis. As the Registry is constrained by the voluntary nature of surgeon identification it is not possible to do this analysis.

These data were provided to Biomet for comment and the Registry received the following comments from the company. "The Oxford unicompartmental knee has attracted a large number of new users in Australia over the last few years, and their accumulated experience exhibits a wide range of outcomes. It is particularly striking that, even in hospitals where more than 100 have been implanted, the revision rates range from 0.9% to 14.6%, despite the use of the same implant and instrumentation". It was also felt by Biomet that the comparator prostheses in general were undertaken more often in hospitals that undertook larger numbers of procedures than the Oxford and this may have contributed to the difference

in the number of revisions. Additionally it was felt because the proportion of diagnosis for revision were similar to that of the comparators then this indicated that there was unlikely to be a specific prosthesis related issue as an underlying cause for the revision".

Biomet also pointed out that the Swedish Knee Arthroplasty Register had demonstrated improved outcomes of the Oxford unicompartmental knee replacement in recent years when compared to the Marmor. They also felt that it was reasonable to expect that this trend would continue.

Preservation unicompartmental knee (Fixed and Mobile)

In the 2004 Annual report the Registry identified the Preservation unicompartmental knee replacement had a higher revision rate when compared to comparator prostheses. It is important to understand that the name Preservation covers a number of different types of unicompartmental prostheses. There are both fixed and mobile (sliding) bearing prostheses. There are also two types of fixed Preservation unicompartmental knees. One has an all poly tibial component the other is a metal tibial base-plate with a polyethylene insert. Last year the Registry highlighted that the revision rates for both the Mobile and Fixed Preservation unicompartmental knees were significantly higher than comparator prostheses. In addition there was no statistical difference between the high revision rates for the Mobile and Fixed Preservation prostheses when compared to each other. In other words there was at that time no statistical evidence of a difference between the two different Preservation prostheses with respect to risk of revision and that both prostheses had a significantly higher rate than the comparators.

The analysis for this year has been undertaken on 1,441 preservation procedures reported to the Registry by the end of 2004. This is an additional 412 procedures compared to last year. The Preservation unicompartmental knee replacements when considered as a group are the second most common unicompartmental knee replacement used in Australia and accounted for 11.4% of all unicompartmental knees undertaken in 2004. This is a slight decline when compared to 2003. At that time the Preservation prostheses accounted for 12.1% of all unicompartmental prostheses used. Of the 1441 procedures recorded in the Registry to the end of 2004, 1098 were Fixed Preservation and 343 were the Mobile Preservation.

i) Fixed Preservation

Of the 1098 fixed Preservation procedures 49 or 4.5% have been revised compared to 2.9% for the comparator prostheses. When comparing revisions per 100 observed component years then there are 2.9 revisions for the fixed Preservation compared to 1.5 for the comparators.

The percentage revised for Fixed Preservation unicompartmental knee replacement at one year is 3.0% and at three years is 7.3%. The comparator prostheses have a percentage revision at one year of 1.5% and at three years 4.5%. (Hazard Ratio (adjusted for age and sex) Preservation-Fixed v Others M/G, Repicci, Unix) = 1.903; 95% CI (1.359, 2.664), P <0.0002) (Table K19 and Figure K17).

The main reason for revision of the Fixed Preservation unicompartmental knee is loosening.

ii) Mobile Preservation

The Mobile Preservation is performed less frequently than the Fixed. There have been 33 revisions of 343 primary mobile Preservation unicompartmental procedures reported to the Registry with a procedure date before the end of 2004. This overall revision rate is 9.6% compared to 2.9% for the comparator prostheses. When comparing revisions per 100 observed component years there are 5.7 revisions per 100 observed component years for the Mobile Preservation compared to 1.5 for the comparators. The percentage revised for Mobile Preservation unicompartmental knee replacement at one year is 4.8% compared to that of the comparators, which is 1.5% at one year. It is not possible for the

Registry to give a figure for the percentage revised at three years, as only a small number of Mobile Preservations have been implanted for three years. Therefore a reliable figure for this time period cannot be given. However the cumulative percentage revision curve indicates that the revision rate is well over 10% at two years. (Hazard Ratio (adjusted for age and sex) Preservation-Mobile v Others M/G, Repicci, Unix) = 3.340; 95% CI (2.243, 4.975), P <0.0001). (Table K19 and Figure K18).

As with the Fixed Preservation the main reason for revision is loosening.

iii) Comparison of Fixed and Mobile Preservation unicompartmental knee replacements.

The Mobile Preservation has a higher revision rate than the Fixed Preservation but as was reported last year this difference is not statistically significant Hazard Ratio Preservation-Mobile v Preservation-Fixed; (adjusted for age and sex): = 1.571 (0.994,2.481) p=0.0529 (Table K20 and Figure K19).

It is possible that a difference may become evident as the number of Mobile Preservation unicompartmental knees increases or the percentage revisions increase at a greater rate than the Preservation Fixed prosthesis. The current situation is however that both the Fixed and Mobile Preservation have a statistically higher revision rate than the comparator prostheses.

iv) Preservation Fixed and Mobile Learning Curve

Since the Registry first reported the higher than anticipated revision rates for both the Fixed and Mobile Preservation last year there have been a number of discussions with the manufacturer (Depuy). They have raised the possibility that surgeon learning curve is a possible explanation for the Registry findings. Unless an analysis by surgeon is undertaken then it is difficult to establish if this is correct. As mentioned previously this Registry is unable to perform surgeon specific analysis. In an attempt to determine if the learning curve was potentially impacting on the revision rate of the Preservation prostheses the Registry has compared revisions rates at one year for two separate years 2002 and 2003. It has done this for both the Fixed and Mobile prostheses. There were a number of reasons for doing this analysis. The prostheses were introduced to Australia in 2001. Similar numbers of the procedure were performed in 2002 and 2003. Selecting these years provided a full year for prostheses to have the same opportunity for revision within one year. The revision rates at one year for these prostheses are significantly higher than would be anticipated. It was not possible to do this analysis on procedures undertaken in 2004 as data analysis would need to include all revisions of the 2004 procedures undertaken in 2005 and these data are not yet available.

The results of this analysis demonstrate a decline in the revision rates at one year for procedures undertaken in 2003 compared to those from 2002. This is for both the Fixed and Mobile Preservation. The difference however is not statistically significant Hazard Ratio Preservation-Fixed (2002 v 2003); adjusted for age and sex): = 1.412 (0.623,3.203) p=0.4085. Hazard Ratio Preservation-Mobile (2002 v 2003); adjusted for age and sex): =1.454 (0.426,4.967) P=0.5506. Hazard Ratio Preservation-Combined (2002 v 2003); adjusted for age and sex): =1.420 (0.721,2.797) P=0.3099 (Table K21).

The results of the Registry analysis were provided to Depuy and they were invited to make comment. The following response was received. “DePuy again acknowledges the findings of the AOA NJRR and is currently in the process of communicating these at focussed uni-compartmental knee replacement training events. The aim of these events is to further decrease the learning curve associated with this type of surgery. As is now generally accepted, the learning curve at the introduction of some new prosthesis and/or surgical techniques can be steep and in some circumstances heavily weight early revision rates. Depuy has noted the reported reduction in one-year revision rates for procedures undertaken in

2003 compared to those in 2002. While the data at this stage may not be significant statistically, DePuy is confident that these prostheses will continue to follow a positive trend as surgical experience with the products continues to grow. DePuy does not attach any significance to conclusions drawn when comparing the Preservation products individually to an amalgamation of three others".

Total knee replacement

Of the 81,561 known primary total knee replacements, 1,516 (1.9%) have been revised (1.0 per 100 observed component years) (Table K14). Loosening (37.7%) is the most common reason for revision.

As with last years report a number of prosthesis independent analyses have been undertaken for primary total knees. These include outcomes related to the intrinsic stability of the prostheses as well as the mobility of the tibial insert. Stability is classified as minimally stabilised, posterior stabilised, fully stabilised (i.e. collateral ligament stability) and hinged. Additionally an analysis comparing the use of a patella prosthesis in primary total knee has also been undertaken.

Mobility

With respect to movement of the tibial insert they have been classified as fixed or mobile. The mobile inserts are sub-classified as rotating, rotating and sliding, and sliding. There is a statistically significant difference at four years in the cumulative revision of fixed primary total knee replacements compared to mobile. (Hazard Ratio (adjusted for age and sex); mobile total knee v fixed total knee = 1.254 95% CI (1.122, 1.400) P <0.0001). (Table K22 and K23 Figure K20). This analysis excludes procedures with cementless Genesis and Profix oxinium femoral components.

Stability

The number of primary procedures using fully stabilised and hinged prostheses is small. This combined with the likelihood that they are used in extreme clinical situations makes it difficult to comment on the risk of revision associated with their use. However large numbers of both minimal stabilised and posterior stabilised prostheses have been used for primary total knee replacement. There is no statistical difference in the revision rates of these two types of prosthesis (Minimally stabilised (1.9% percentage revision, 0.97 revisions per 100 component years: Posterior stabilised 1.7% percentage revision and 1.02 revisions per 100 component years) (Table K24 Figure K21)

Patella Prosthesis v No Patella Prosthesis

In primary total knee replacement when a patella component is not used there is an increased risk of revision. (Hazard ratio (adjusted for age and sex); Patella v No Patella) = 1.388; 95% CI (1.248,1.544) P <0.0001) (Table K25 and Figure K22). The interpretation of this finding is difficult. The difference in the revision procedures for both groups relates principally to patella only revisions most of which are done for the diagnosis of pain. The question that the Registry is unable to resolve relates to whether this difference is more a measure of opportunity for revision. A patient post primary total knee replacement with pain and no patella prosthesis presents the surgeon with a choice to proceed with a patella only replacement. This opportunity to revise is less if the patella has already been replaced. In order to resolve this issue it is necessary to know the incidence and severity of pain in patients with and without a patella replacement. Despite this it is clear that patients without a patella replacement have a significantly higher number of revisions compared to those where the patella was replaced as part of the primary procedure.

Total knee prosthesis: Individual prostheses specific revision rates.

The prosthesis specific early revision rates for all primary total knee prostheses have been determined with individual revision rates and rate per 100 observed component years. All prostheses included in this table have over 1,000 observed component years (Table K26). The five prostheses with the lowest revision rates are highlighted in (Table K27). The Registry has identified five prostheses with higher than anticipated revision rates. Four of these are prostheses

that used cementless oxinium femoral components. It is acknowledged that the high revision rate of cementless oxinium femoral components is well known and they are no longer used with cementless fixation. It is also worth highlighting that at this time the cemented oxinium femoral components do not have a statistically significant different number of revisions compared to all other femoral components. Of the 540 cemented oxinium femoral components reported to the Registry, six have been revised (1.1%) and 1.8 revisions per 100 observed component years. Analysis of prostheses using the cementless oxinium femoral components has been undertaken. It details the extent and prosthesis specific variation of these revisions in the Australian setting.

The prostheses are:

1. Genesis II/Fixed bearing with cementless Oxinium femoral component
2. Genesis II/Mobile bearing with cementless Oxinium femoral component
3. Profix/fixed bearing with cementless Oxinium femoral component
4. Profix/mobile bearing with cementless Oxinium femoral component
5. Profix/mobile bearing not using cementless Oxinium femoral component

Genesis II/Fixed bearing, cementless Oxinium femoral component v cementless non oxinium femoral component

The analysis for this report was undertaken on the 105 cementless oxinium prostheses inserted using a fixed bearing Genesis II tibial base plate. To the end of the current observation period there have been 25 revisions of this prosthesis (23.8%) and 16.1 revisions per 100 component years. (Hazard Ratio (adjusted for age and sex); Genesis II/fixed bearing with cementless oxinium v Genesis II/fixed with non-oxinium cementless femoral component = 8.395; 95% CI (4.794,14.703) P <0.0001).

Genesis II/Mobile bearing, cementless Oxinium femoral component v non oxinium femoral component

The Registry has received reports on 88 Genesis II cementless oxinium femoral components used in combination with a mobile bearing tibial component. Of these 41 have been revised (46.6%) and there has been 33.0 revisions per 100 observed component years. (Hazard Ratio (adjusted for age and sex); Genesis II/Mobile bearing with cementless oxinium v Genesis II/Mobile bearing with non-oxinium cementless femoral component = 24.630; 95% CI (12.766, 47.520) P <0.0001)**.**

Cementless Genesis 11 oxinium femoral component, fixed bearing v mobile bearing

Primary total knees using a cementless oxinium femoral component in combination with a mobile bearing tibial component are significantly more likely to require revision when compared to those used in combination with a fixed bearing tibial component (Table K28 and Figure K23).

Profix/Fixed bearing, cementless Oxinium femoral component v cementless non oxinium femoral component

The Registry has received reports on 71 Profix cementless oxinium femoral components used in combination with a fixed bearing tibial component. Of these 19 have been revised (26.8%) and there have been 17.3 revisions per 100 observed component years (Hazard Ratio (adjusted for age and sex); Profix/fixed bearing with cementless oxinium v Profix/fixed bearing with non oxinium cementless femoral component = 15.623; 95% CI (7.410, 32.941) P <0.0001).

Profix/Mobile bearing, cementless Oxinium femoral component v non oxinium femoral component

The Registry has received reports on 158 Profix cementless oxinium femoral components used in combination with a mobile bearing tibial component. Of these 37 have been revised (23.4%) and there have been 13.7 revisions per 100 observed component years. (Hazard Ratio (adjusted for age and sex); Profix/Mobile bearing with cementless oxinium v Profix/Mobile bearing with non oxinium cementless

femoral component = 3.860; 95% CI (2.178, 6.841) P <0.0001).

Profix fixed bearing v mobile bearing

Unlike the Genesis II there is no significant difference in revision rates between mobile bearing and fixed tibial components when used in combination with a cementless Profix oxinium femoral component (Table K29 and Figure K24).

The standard (Non Oxinium) Profix femoral component when used in combination with a mobile bearing tibial component was found to have a higher than anticipated revision rate than to all other primary total knees and also to standard Profix femoral components used in combination with a fixed bearing tibial component. The Registry analysed the results of 819 primary procedures using this prosthesis. There have been 29 revisions (3.5%) and 2.5 revisions per 100 observed component years. This compares to 1.9% and 1.0 revision per 100 observed component years for all primary total knee prostheses and 1.7% and 1.0 revision per 100 observed component years for the Profix in combination with a fixed bearing tibial component. This difference is statistically significant (Hazard Ratio Standard Profix/Mobile Bearing v Standard Profix/Profix (adjusted for age and sex) 2.214; 95% CI (1.382,3.546) P =0.0009 (Table K29 and Figure K24).

Smith and Nephew is the manufacturer of each of the primary total knee prostheses identified as having a higher number of revisions than anticipated. Essentially however apart from the standard Profix femoral component in combination with a mobile bearing tibial component the other prostheses were associated with the use of a cementless Oxinium femoral component. The information was provided to the company and the Registry received the following response. “We are aware of the issues surrounding the press-fit (macrotextured) oxinium implants and have completed a global, voluntary recall of these devices last year. With respect to the Profix mobile bearing S&N has closely followed the clinical results of its mobile-bearing system as part of an FDA IDE study. One result of this follow-up is the redesign of the insert locking screw from a standard thread form to a spiral-lock-thread form to ensure that the screw cannot disengage”.

Knee Replacement - 1/9/1999 to 31/12/2004

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 K1: Number of Knee Replacements by sex

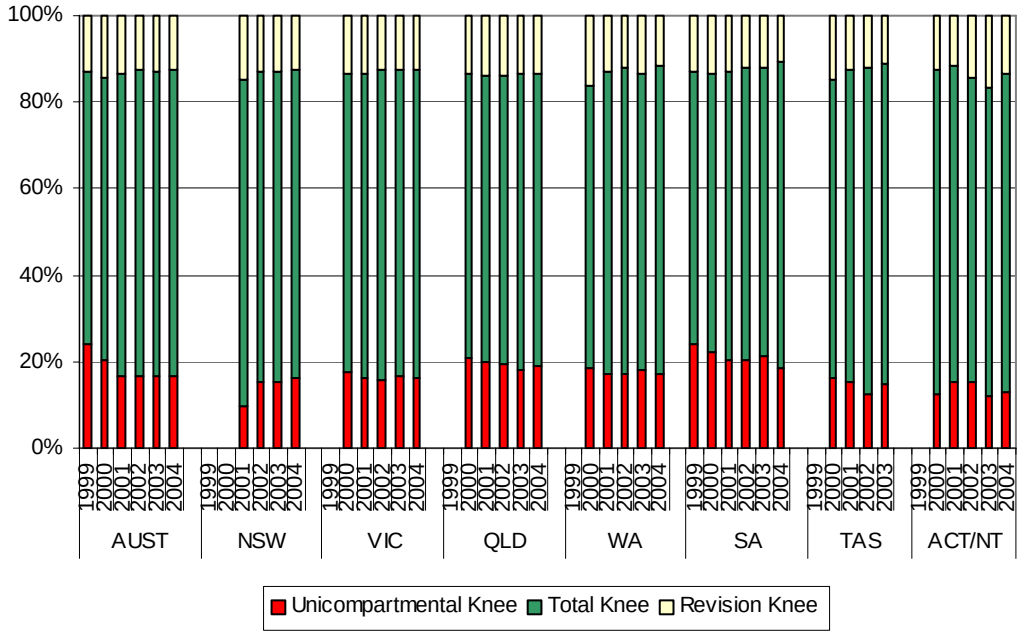
Type of knee replacement	*Female*		*Male*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
UniSpacer	18	50.0	18	50.0	36	0.0
Patella/trochlear	375	75.9	119	24.1	494	0.5
Unicompartmental Knee	6995	48.3	7473	51.7	14468	13.7
Primary Total Knee	46638	57.2	34923	42.8	81561	77.1
Revision Knee	4798	52.4	4366	47.6	9164	8.7
Total	**58824**	**55.6**	**46899**	**44.4**	**105723**	**100.0**

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

Table K2: Summary statistics of age for All Knee Replacements

Type of knee replacement	*<=54*		*55-64*		*65-74*		*75-84*		*>=85*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
UniSpacer	16	44.4	16	44.4	3	8.3	1	2.8	.	.	36	0.0
Patella/trochlear	203	41.1	145	29.4	84	17.0	54	10.9	8	1.6	494	0.5
Unicompartmental	1943	13.4	4541	31.4	4773	33.0	2960	20.5	251	1.7	14468	13.7
Primary Total Knee	5501	6.7	17968	22.0	31250	38.3	24291	29.8	2551	3.1	81561	77.1
Revision Knee	798	8.7	1839	20.1	3057	33.4	3048	33.3	422	4.6	9164	8.7
Total	**8461**	**8.0**	**24509**	**23.2**	**39167**	**37.0**	**30354**	**28.7**	**3232**	**3.1**	**105723**	**100.0**

Figure K1: Trends in Usage for Unicompartmental, Primary Total and Revision Knee Replacement by State and Territory



***Note**: see Table NJRR1 Dates of implementation by state and territory*

Prosthesis Fixation and Usage - 1/9/1999 to 31/12/2004

Unispacer Prostheses

Table K3: Prosthesis Usage - Unispacer

Unispacer	*Number*	*%*
InterCushion	9	25.0
Unispacer	27	75.0
Total	**36**	**100.0**

Prosthesis Fixation and Usage

Patella/trochlear Replacement

Table K4: Prosthesis Usage - Patella/trochlear Replacement

Patella/trochlear replacement	*Patella*	*Number*	*%*
Avon	Kinemax Plus	156	31.6
	Avon	12	2.4
	-	3	0.6
	Duracon	1	0.2
	Nexgen	1	0.2
LCS	LCS	136	27.5
	-	5	1.0
	Nexgen	1	0.2
	PFC Sigma	1	0.2
	Scorpio	1	0.2
Lubinus Patella Glide	Duracon	47	9.5
	Lubinus Patella Glide	32	6.5
MOD III	MOD III	51	10.3
	LCS	4	0.8
	-	1	0.2
	Genesis II	1	0.2
	Resurfacing System	1	0.2
Themis	Themis	29	5.9
	-	1	0.2
	Nexgen	1	0.2
RBK	RBK	8	1.6
Global Custom Made	-	1	0.2
Total		**494**	**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 K5: Prosthesis Fixation - Unicompartmental Knee Replacement

Fixation	*Number*	*%*
Tibial and femoral cementless	1162	8.0
Tibial and femoral cemented	13205	91.3
Tibial only cemented	42	0.3
Femoral only cemented	59	0.4
Total	**14468**	**100.0**

Figure K2: Trends in Prosthesis Fixation – Unicompartmental Knee Replacement by State and Territory

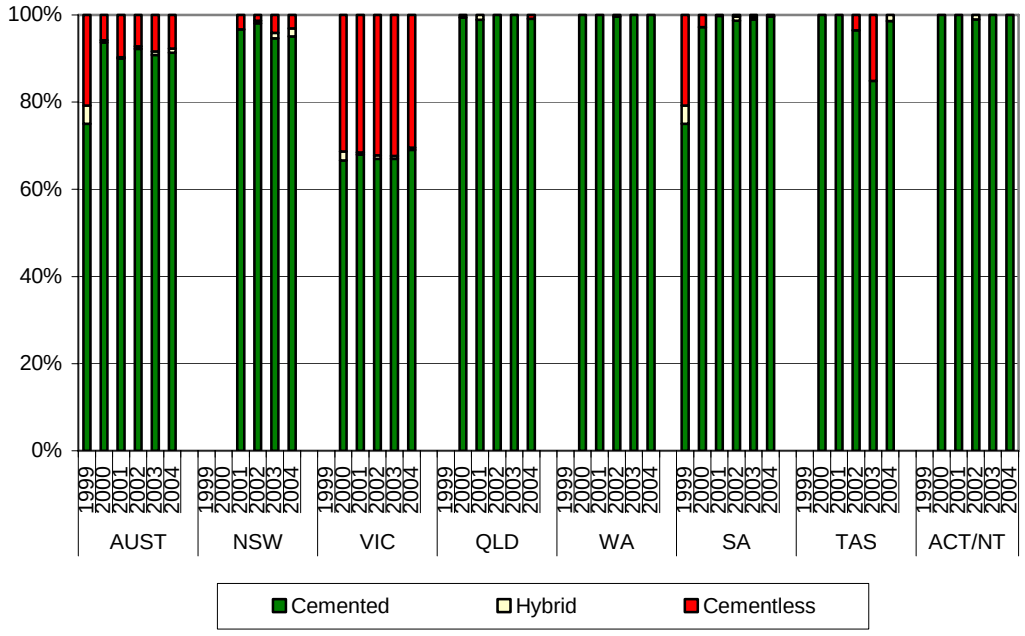


Table K6: Top 10 Unicompartmental Knee Prostheses used in Primary Knee

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	Oxford 3 (10)	Oxford 3 (345)	Oxford 3 (1056)	Oxford 3 (1577)	Oxford 3 (1359)	Oxford 3 (1124)
2	LCS (5)	Allegretto Uni (111)	Repicci (337)	Repicci (579)	Repicci (420)	Repicci (365)
3	M/G (5)	M/G (70)	Allegretto Uni (232)	Allegretto Uni (373)	Preservation fixed (371)	M/G (362)
4	Repicci (2)	PFC Sigma (34)	M/G (209)	M/G (334)	M/G (349)	Preservation fixed (354)
5	Genesis (1)	Unix (30)	Unix (182)	Preservation fixed (294)	Allegretto Uni (336)	Genesis (291)
6	PFC Sigma (1)	Genesis (22)	PFC Sigma (90)	Unix (236)	GRU (318)	GRU (286)
7		Repicci (13)	Preservation fixed (79)	Genesis (129)	Genesis (276)	Unix (237)
8		LCS (7)	Genesis (51)	Preservation mobile (149)	Unix (260)	Allegretto Uni (186)
9		Natural Knee (5)	Natural Knee (37)	GRU (46)	Preservation mobile (121)	Endo-Model Sled (172)
10			Preservation mobile (15)	Natural Knee (42)	Endo-Model Sled (101)	AMC (64)
% Procedures using Top 10	100%	100%	99.5%	98.3%	96.2%	95.1%
Total N Procedures	24	637	2300	3823	4065	3619
Total N Prosthesis Types	6	9	12	14	14	15

Figure K3: Top 5 Unicompartmental Knee Prostheses used in Primary Knee

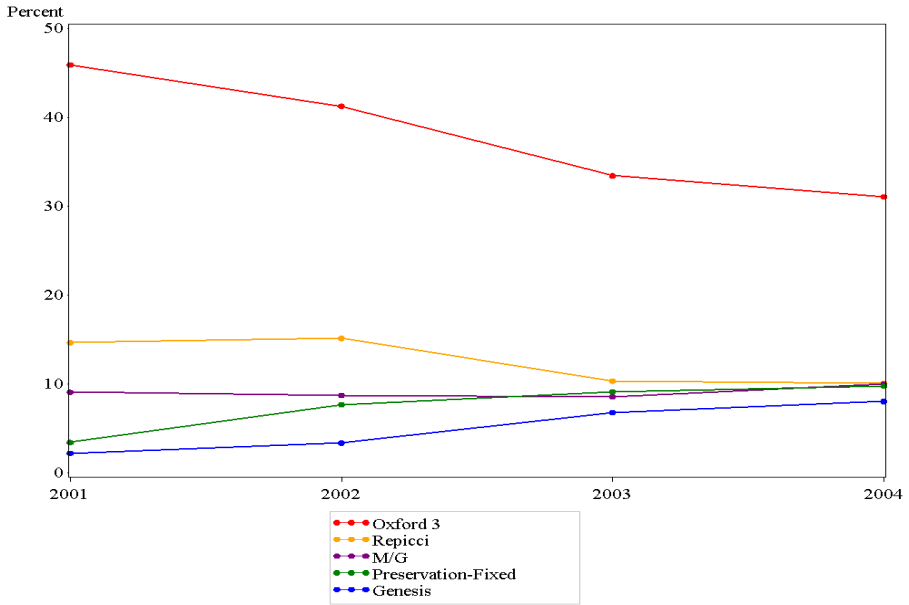


Table K7: Prosthesis Fixation - Primary Total Knee Replacement

Fixation	***Total***		***Patella used***			
			Patella cementless		*Patella cemented*	
	Number	*%*	*Number*	*%†*	*Number*	*%†*
Tibial and femoral cementless	19454	23.9	1995	10.3	4395	22.6
Tibial and femoral cemented	39418	48.3	46	0.1	19604	49.7
Tibial only cemented	22121	27.1	270	1.2	8326	37.6
Femoral only cemented	568	0.7	8	1.4	280	49.3
Total	**81561**	**100.0**	**2319**	**2.8**	**32605**	**40.0**

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

Figure K4: Trends in Prosthesis Fixation – Primary Total Knee by State and Territory

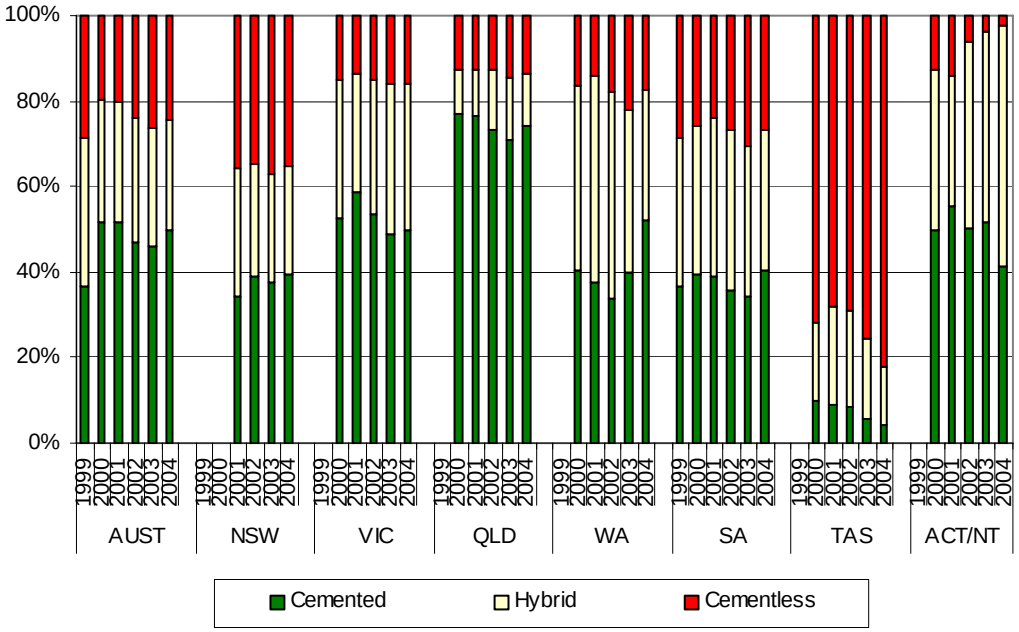


Figure K5: Trends in Patella Usage for Primary Total Knee Replacement by State and Territory

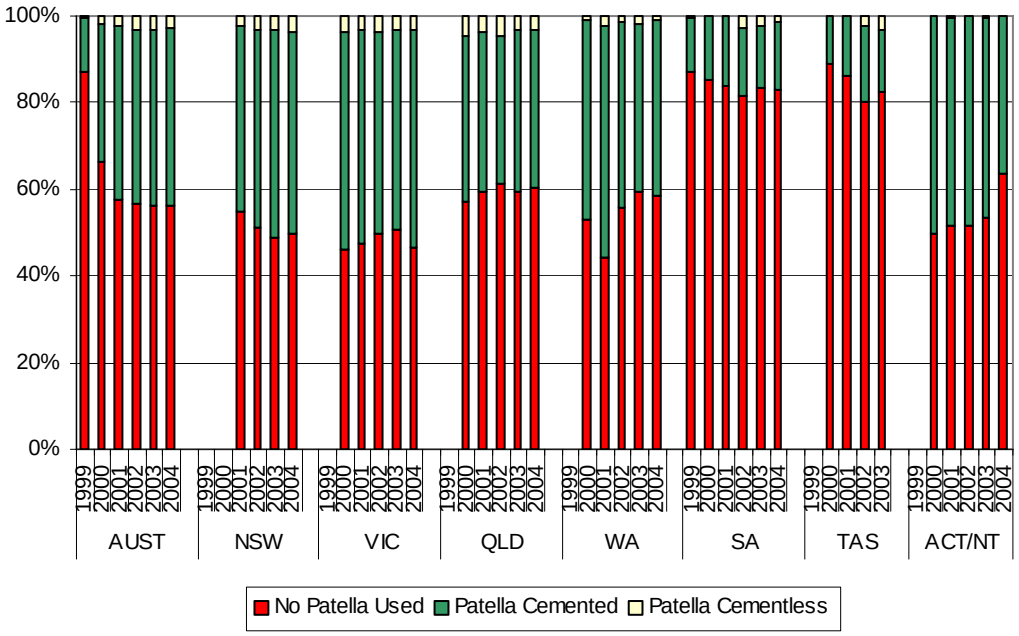


Table K8: Top 10 Prostheses Used in Primary Total Knee

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	LCS (62)	LCS (826)	LCS (2471)	LCS (3139)	LCS (3176)	LCS (3486)
2	AGC 53)	Duracon (706)	Duracon (1842)	Duracon (3011)	Duracon (2835)	Genesis II (2979)
3	Nexgen (43)	Genesis II (481)	Genesis II (1501)	Nexgen (2016)	Genesis II (2242)	Duracon (2634)
4	AMK (41)	Nexgen (409)	Nexgen (1173)	Genesis II (1835)	Nexgen (2154)	Nexgen (2483)
5	Duracon (36)	Scorpio (331)	Scorpio (1057)	PFC Sigma (1778)	Scorpio (2109)	PFC Sigma (2436)
6	Scorpio (31)	PFC Sigma (221)	PFC Sigma (905)	Scorpio (1751)	PFC Sigma (1936)	Scorpio (2123)
7	Genesis II (22)	AGC (212)	Nexgen LPS (591)	Profix (943)	Profix (1193)	Nexgen LPS Flex (1231)
8	Advantim (17)	Advantim (131)	AGC (532)	Nexgen LPS (857)	Natural Knee (998)	Profix (1197)
9	PFC Sigma (16)	Profix (120)	Natural Knee (439)	Natural Knee (811)	Nexgen LPS (901)	Active Knee (804)
10	Maxim (12)	Nexgen LPS (117)	Kinemax Plus (357)	AGC (633)	Nexgen LPS Flex (681)	Nexgen LPS (743)
% Procedures using Top 10	90%	83.6%	85.5%	86.3%	84.2%	87%
Total N Procedures	370	4251	12718	19448	21652	23122
Total N Prosthesis Types	16	33	50	51	46	45

Figure K6: Top 5 Prostheses Used in Primary Total Knee

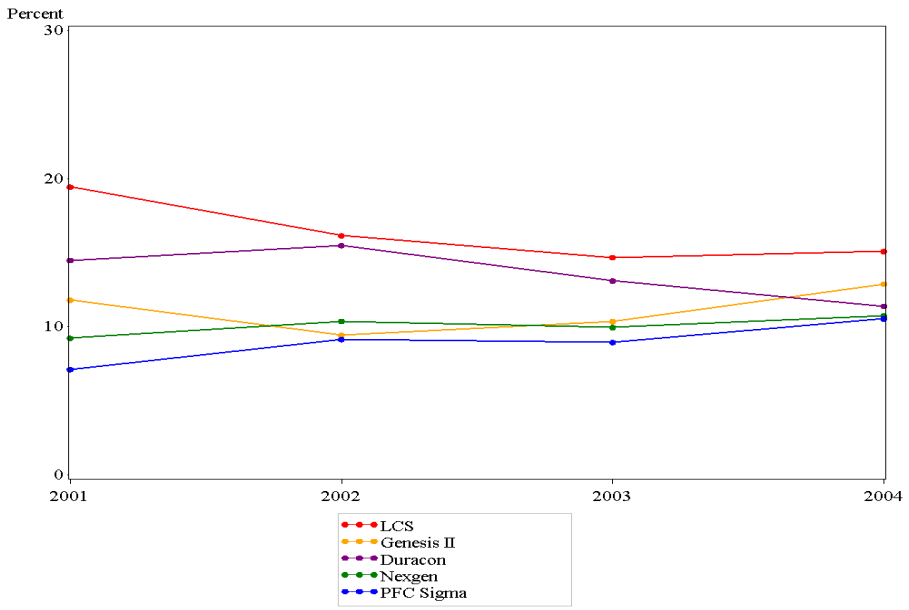


Table K9: Top 10 Prostheses Used in Cementless Primary Total Knee

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	LCS (39)	LCS (317)	LCS (864)	LCS (1299)	LCS (1468)	LCS (1743)
2	Nexgen (16)	Nexgen (111)	Nexgen (402)	Nexgen (752)	Nexgen (784)	Nexgen (785)
3	Advantim (12)	Duracon (94)	Duracon (253)	Duracon (525)	Scorpio (499)	Active Knee (666)
4	Duracon (11)	Genesis II (73)	Scorpio (210)	Natural Knee (373)	Natural Knee (490)	Scorpio (539)
5	Maxim (11)	Advantim (55)	Natural Knee (180)	Scorpio (319)	Active Knee (477)	Duracon (372)
6	Interax (8)	Natural Knee (46)	Genesis II (126)	RBK (229)	Duracon (476)	Natural Knee (368)
7	AMK (6)	Scorpio (46)	Maxim (108)	PFC Sigma (223)	PFC Sigma (313)	PFC Sigma (320)
8	Natural Knee (2)	Maxim (32)	Profix (85)	Active Knee (194)	Profix (300)	RBK (275)
9	Scorpio (1)	Interax (27)	Advantim (77)	Profix (190)	RBK (300)	Profix (202)
10		Profix (20)	AMK (61)	Maxim (135)	Maxim (136)	Maxim (83)
% Procedures using top 10	100%	97.7%	91.5%	91.2%	92.5%	95.6%
Total N Procedures	106	840	2587	4650	5671	5600
Total N Prosthesis Types	9	14	21	27	20	20

Figure K7: Top 5 Prostheses Used in Cementless Primary Total Knee

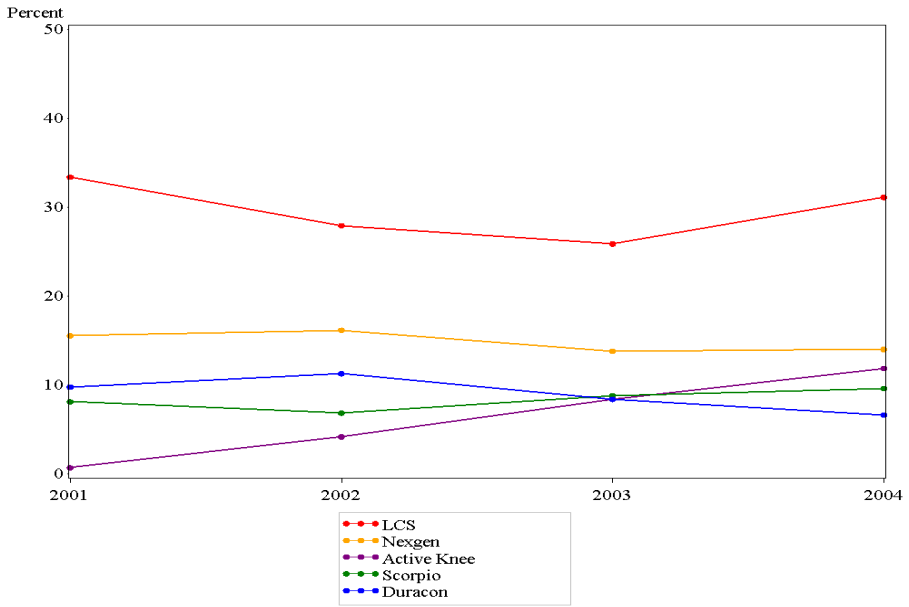


Table K10: Top 10 Prostheses Used in Cemented Primary Total Knee

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	AGC (32)	LCS (360)	LCS (1193)	Genesis II (1342)	Genesis II (1633)	Genesis II (2389)
2	Genesis II (21)	Duracon (306)	Genesis II (1041)	LCS (1183)	Duracon (1240)	PFC Sigma (1365)
3	Nexgen (21)	Genesis II (290)	Duracon (794)	Duracon (1172)	LCS (981)	Nexgen LPS Flex (1223)
4	Scorpio (12)	Nexgen (230)	Nexgen LPS (558)	PFC Sigma (862)	PFC Sigma (836)	Duracon (1206)
5	AMK (10)	AGC (133)	PFC Sigma (455)	Nexgen LPS (767)	Nexgen LPS (828)	LCS (988)
6	PFC Sigma (8)	Nexgen LPS (114)	Nexgen (409)	Nexgen (703)	Nexgen (800)	Nexgen (940)
7	Series 7000 (8)	Scorpio (106)	AGC (359)	Scorpio (618)	Scorpio (710)	Profix (709)
8	Advantim (5)	Kinemax Plus (102)	Kinemax Plus (347)	Profix (515)	Nexgen LPS Flex (678)	Scorpio (708)
9	LCS (5)	PFC Sigma (100)	Scorpio (344)	AGC (406)	Profix (640)	Nexgen LPS (657)
10	Duracon (4)	Profix (82)	Profix (181)	Kinemax Plus (393)	AGC (394)	AGC (370)
% Procedures using Top 10	92.6%	83.1%	86.8%	87.3%	87.7%	92.1%
Total N Procedures	136	2194	6542	9123	9968	11455
Total N Prosthesis Types	15	31	47	42	40	38

Figure K8: Top 5 Prostheses Used in Cemented Primary Total Knee

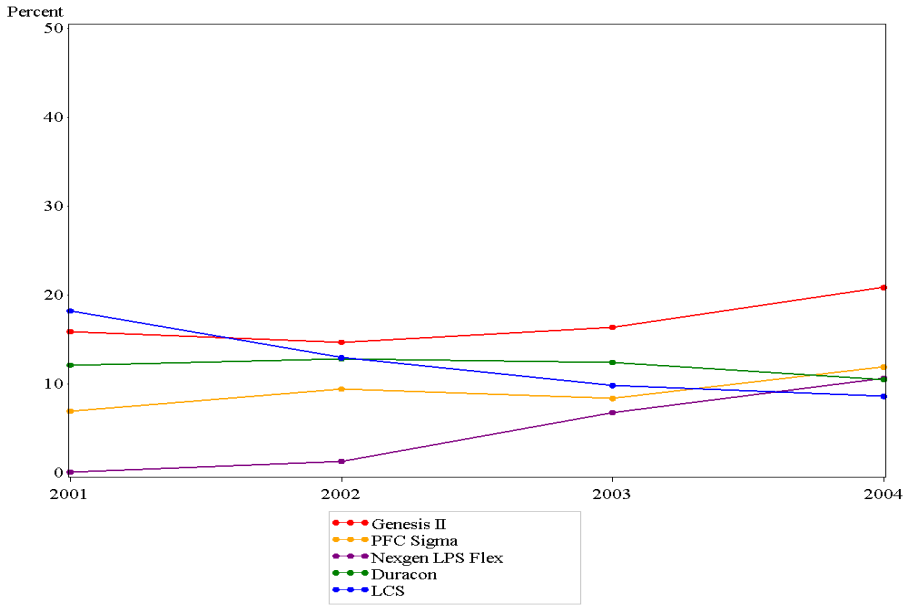


Table K11: Top 10 Prostheses Used in Hybrid Primary Total Knee

Rank	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
1	AMK (25)	Duracon (306)	Duracon (795)	Duracon (1314)	Duracon (1119)	Duracon (1056)
2	AGC (21)	Scorpio 179)	Scorpio (503)	Scorpio (814)	Scorpio (900)	Scorpio (876)
3	Duracon (21)	LCS (149)	LCS (414)	PFC Sigma (693)	PFC Sigma (787)	Nexgen (758)
4	LCS (18)	PFC Sigma (121)	PFC Sigma (409)	LCS (657)	LCS (727)	LCS (755)
5	Scorpio (18)	Genesis II (118)	Nexgen (362)	Nexgen (561)	Nexgen (570)	PFC Sigma (751)
6	PFC Sigma (8)	AGC (79)	Genesis II (334)	Genesis II (383)	Genesis II (482)	Genesis II (508)
7	Nexgen (6)	AMK (71)	AGC (173)	Natural Knee (238)	Profix (253)	Profix (286)
8	Natural Knee (5)	Nexgen (68)	Natural Knee (147)	Profix (238)	Maxim (250)	Maxim (281)
9	Trac (3)	Natural Knee (51)	Nexgen MBK (79)	AGC (226)	Natural Knee (236)	Natural Knee (203)
10	Genesis II (1)	Trac (23)	Profix (72)	Maxim (105)	AGC (191)	AGC (136)
% Procedures using Top 10	98.4%	95.7%	91.6%	92.1%	91.7%	92.5%
Total N Procedures	128	1217	3589	5675	6013	6067
Total N Prosthesis Types	12	24	34	30	34	32

Figure K9: Top 5 Components Used in Hybrid Primary Total Knee

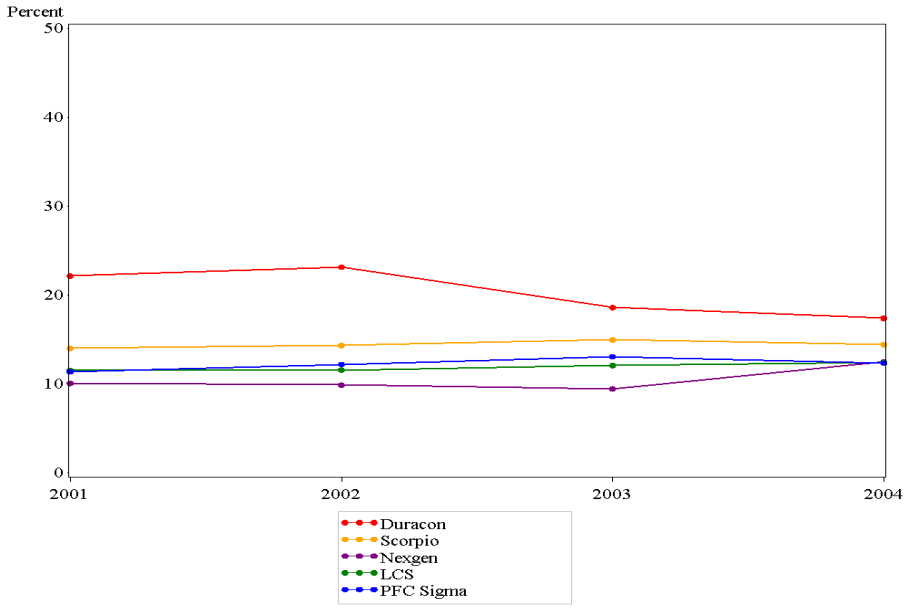
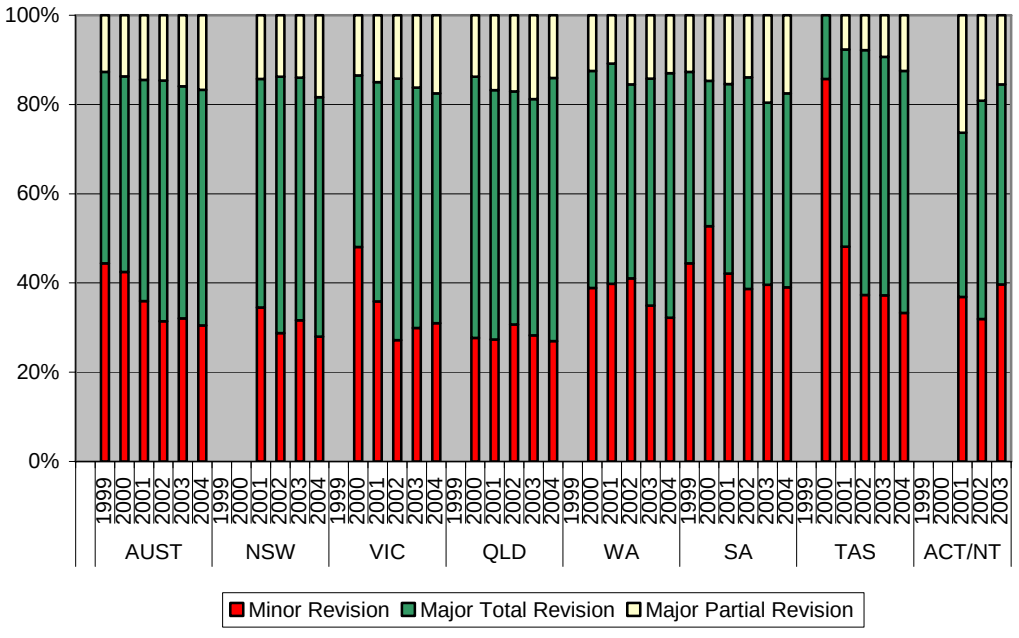


Table K12: Prosthesis Fixation - Major Revision Knee Replacement

Components Used	*Cemented*		*Cementless*		*Tibial cemented Femoral cementless*		*Tibial cementless Femoral cemented*		*N/A*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Tibial And Femoral	3515	57.2	285	4.6	374	6.1	139	2.3	.	.	4313	70.1
Tibial Only*	843	13.7	39	0.6	.	.	.	.	.	.	882	14.3
Femoral Only*	398	6.5	34	0.6	.	.	.	.	.	.	432	7.0
Uni Tibial and Femoral	27	0.4	2	0.0	1	0.0	2	0.0	.	.	32	0.5
Uni Tibial Only*	59	1.0	6	0.1	.	.	.	.	.	.	65	1.1
Uni Femoral Only*	34	0.6	2	0.0	.	.	.	.	.	.	36	0.6
Cement Spacer	.	.	.	.	.	.	.	.	285	4.6	285	4.6
Removal of Prostheses	.	.	.	.	.	.	.	.	69	1.1	69	1.1
Fusion Nail	.	.	.	.	.	.	.	.	23	0.4	23	0.4
Reinsertion of Components†	3	0.0	.	.	1	0.0	1	0.0	.	.	5	0.1
Patella/Trochlear Resurfacing	7	0.1	.	.	.	.	.	.	.	.	7	0.1
Total	**4886**	**79.5**	**368**	**6.0**	**376**	**6.1**	**142**	**2.3**	**377**	**6.1**	**6149**	**100.0**

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

Figure K10: Trends in Usage for Revision Knee Replacement by State and Territory



Bilateral Knee Replacement

1/9/1999 to 31/12/2004

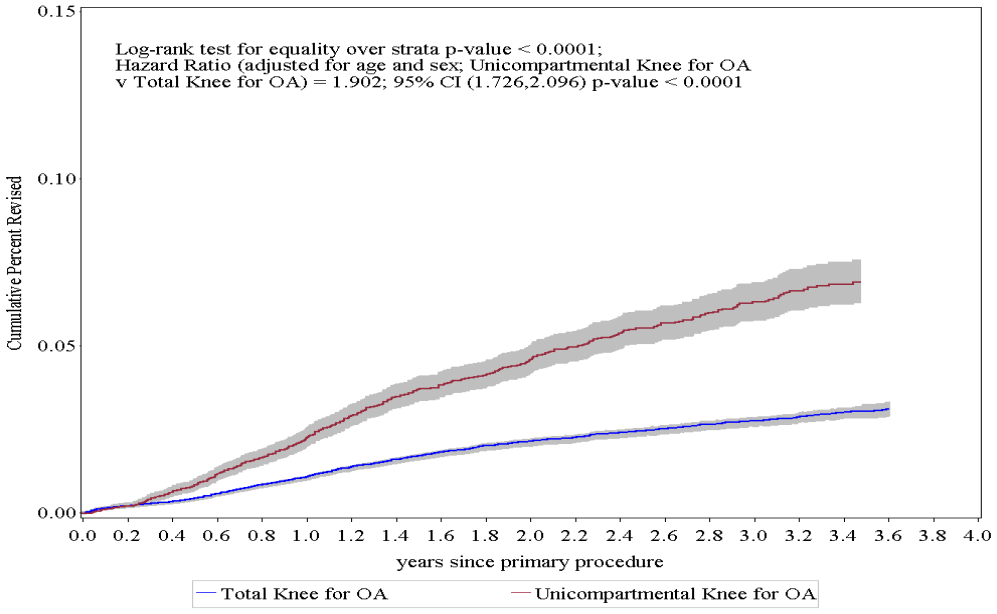
Table K13: Days between procedures for Bilateral Primary Knees

Procedures	***Days between Bilateral Procedures***										***Total***	
	Same Day		*<2 weeks*		*2-6 weeks*		*6 weeks - 6 months*		*> 6 months*			
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Both Patella/trochlear	52	0.4	2	0.0	1	0.0	8	0.1	13	0.1	76	0.6
Both Primary Total	3094	23.6	159	1.2	59	0.5	1899	14.5	5484	41.9	10695	81.7
Both Unicompartmental	854	6.5	27	0.2	14	0.1	281	2.1	546	4.2	1722	13.2
Patella/trochlear & Primary Total Knee	1	0.0	.	.	.	.	.	.	6	0.0	7	0.1
Patella/trochlear & Unicompartmental	.	.	.	.	.	.	.	.	3	0.0	3	0.0
Primary Total Knee & Primary Unispacer	.	.	.	.	.	.	1	0.0	.	.	1	0.0
Unicompartmental & Primary Total	106	0.8	4	0.0	3	0.0	67	0.5	401	3.1	581	4.4
Unicompartmental & Primary Unispacer	.	.	.	.	.	.	1	0.0	.	.	1	0.0
Total	**4107**	**31.4**	**192**	**1.5**	**77**	**0.6**	**2257**	**17.2**	**6453**	**49.3**	**13086**	**100.0**

Table K14: 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	12	36	33.3	27	45.1	(23.29, 8.73)
Patella/Trochlear	19	494	3.8	822	2.3	(1.39, 3.61)
Unicompartmental	611	14468	4.2	27293	2.2	(2.06, 2.42)
Primary Total	1516	81561	1.9	154783	1.0	(0.93, 1.03)
Total	**2158**	**96559**	**2.2**	**182926**	**1.2**	**(1.13, 1.23)**

Figure K11: Cumulative % of Revision of Unicompartmental and Total Knees for Osteoarthritis



Outcomes of Primary Knee Replacement

Unispacer Prostheses

Table K15: Unispacer Procedures requiring Revision

Unispacer	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
InterCushion	1	9	11.1	5	21.6	(0.55, 120.4)
Unispacer	11	27	40.7	22	50.0	(24.96, 89.47)
Total	**12**	**36**	**33.3**	**27**	**45.1**	**(23.29, 78.73)**

Outcomes of Primary Knee Replacement

Patella/trochlear Replacement

Table K16: Patella/Trochlear Procedures requiring Revision

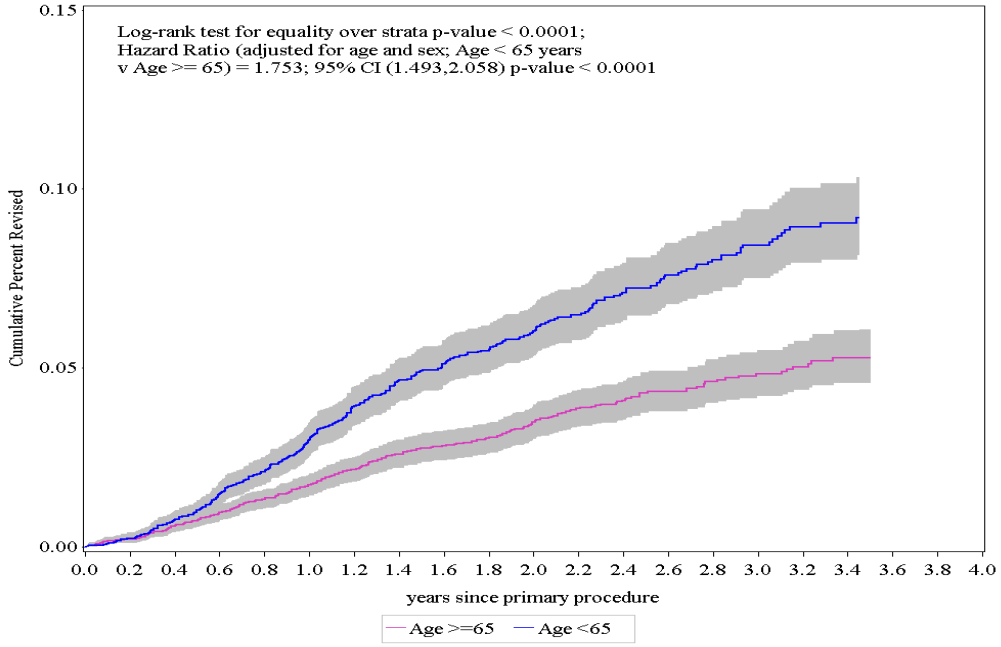
Patellar/ Trochlear	*Patella*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Avon	-	1	3	33.3	9	10.8	(0.27, 60.26)
Avon	Avon	0	12	0.0	3	0.0	(0.00, 116.0)
Avon	Duracon	0	1	0.0	1	0.0	(0.00, 285.5)
Avon	Kinemax Plus	4	156	2.6	330	1.2	(0.33, 3.10)
Avon	Nexgen	0	1	0.0	2	0.0	(0.00, 212.9)
Global Cus/Made	-	0	1	0.0	2	0.0	(0.00, 181.1)
LCS	-	1	5	20.0	7	14.6	(0.37, 81.34)
LCS	LCS	3	136	2.2	155	1.9	(0.40, 5.65)
LCS	Nexgen	0	1	0.0	2	0.0	(0.00, 162.7)
LCS	PFC Sigma	0	1	0.0	0	0.0	(0.00, 4491)
LCS	Scorpio	0	1	0.0	2	0.0	(0.00, 212.9)
Lubinus Pat Glide	Duracon	0	47	0.0	58	0.0	(0.00, 6.39)
Lubinus Pat Glide	Lubinus Pat Glide	4	32	12.5	66	6.1	(1.66, 15.60)
MOD III	-	0	1	0.0	3	0.0	(0.00, 142.1)
MOD III	Genesis II	0	1	0.0	1	0.0	(0.00, 312.6)
MOD III	LCS	1	4	25.0	9	10.6	(0.27, 59.18)
MOD III	MOD III	4	51	7.8	140	2.9	(0.78, 7.34)
MOD III	Resurfacing	0	1	0.0	5	0.0	(0.00, 72.32)
RBK	RBK	0	8	0.0	4	0.0	(0.00, 93.37)
Themis	-	1	1	100.0	1	190.2	(4.82, 1060)
Themis	Nexgen	0	1	0.0	0	0.0	(0.00, 1104)
Themis	Themis	0	29	0.0	23	0.0	(0.00, 16.08)
Total		**19**	**494**	**3.8**	**822**	**2.3**	**(1.39, 3.61)**

Note: *- equals no patella component used*

Table K17: Unicompartmental procedures requiring revision by Age

Age	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
<65	352	6484	5.4	11886	3.0	(2.66, 3.29)
>=65	259	7984	3.2	15406	1.7	(1.48, 1.90)
Total	**611**	**14468**	**4.2**	**27293**	**2.2**	**(2.06, 2.42)**

Figure K12: Comparative Cumulative % of Revision of Unicompartmental Knee Prostheses in relation to Age



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
<65	6484	6237	5899	5292	4588	3717	2829	1846	892
>=65	7984	7637	7161	6403	5400	4299	3123	2027	989

Table K18: Unicompartmental Primary Knee Procedures requiring Revision
Individual and combined revision for 3 comparators

Model	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Unix	31	945	3.3	1810	1.7	(1.16, 2.43)
Repicci	41	1716	2.4	3408	1.2	(0.86, 1.63)
M/G	45	1329	3.4	2538	1.8	(1.29, 2.37)
Total	**117**	**3990**	**2.9**	**7756**	**1.5**	**(1.25, 1.81)**

Table K19: Unicompartmental Primary Knee Procedures requiring Revision

Model	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Allegretto Uni Knee	67	1238	5.4	2703	2.5	(1.92, 3.15)
Endo-Model Sled	6	310	1.9	299	2.0	(0.74, 4.37)
GRU	9	650	1.4	693	1.3	(0.59, 2.47)
Genesis	26	770	3.4	1110	2.3	(1.53, 3.43)
M/G	45	1329	3.4	2538	1.8	(1.29, 2.37)
Natural Knee	15	139	10.8	296	5.1	(2.84, 8.36)
Oxford 3	265	5471	4.8	11346	2.3	(2.06, 2.63)
PFC Sigma	9	137	6.6	476	1.9	(0.86, 3.59)
Preservation-Fixed	49	1098	4.5	1665	2.9	(2.18, 3.89)
Preservation-Mobile	33	343	9.6	584	5.7	(3.89, 7.94)
Repicci	41	1716	2.4	3408	1.2	(0.86, 1.63)
Unix	31	945	3.3	1810	1.7	(1.16, 2.43)
Others (7)	15	322	4.7	365	4.1	(2.30, 6.78)
Total	**611**	**14468**	**4.2**	**27293**	**2.2**	**(2.06, 2.42)**

Note: *- Only prostheses with over 250 observed component years have been listed*

Figure K13: Cumulative percentage of Revision of Unicompartmental Knee Prostheses

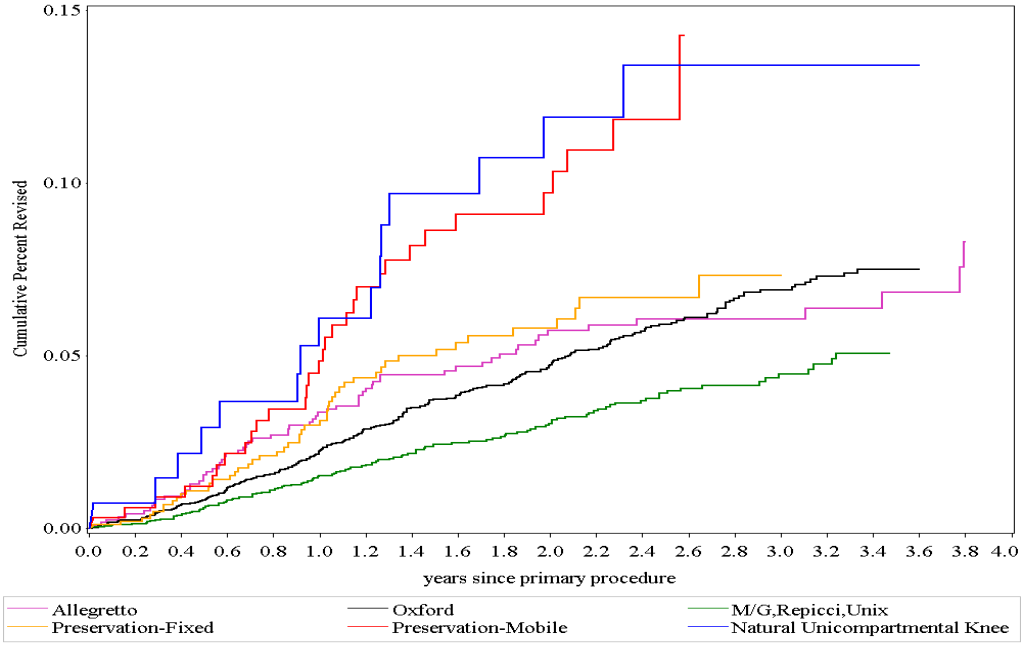
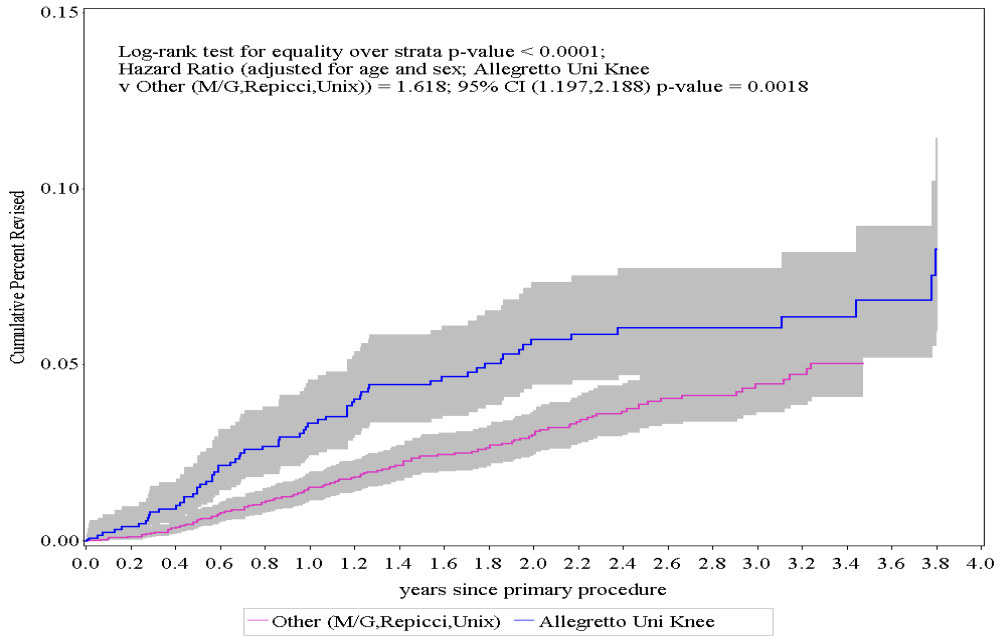
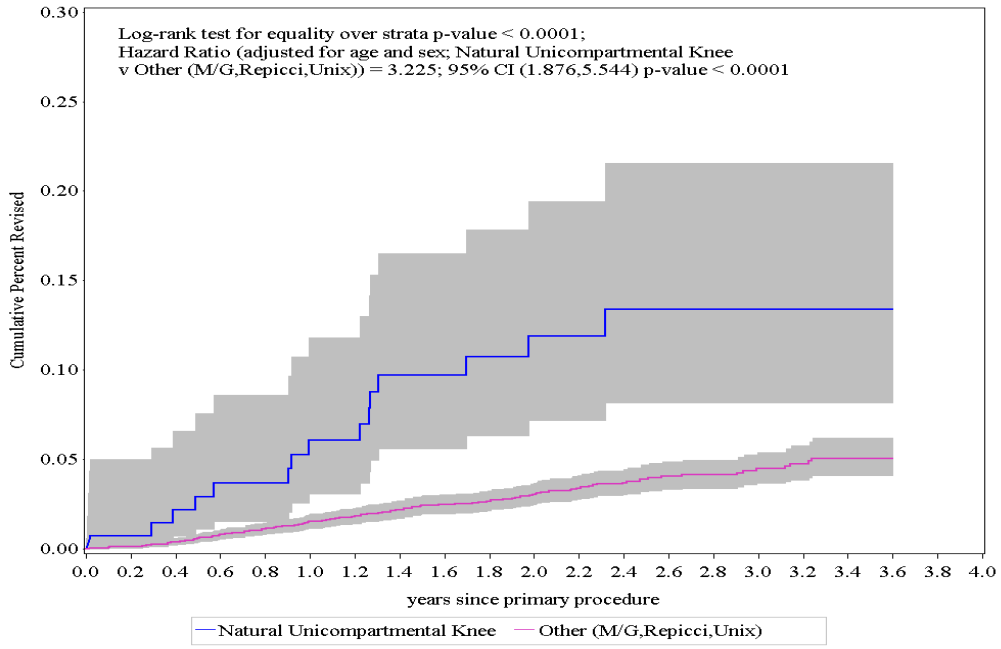


Figure K14: Cumulative percentage of Revision of Allegretto Unicompartmental Knee and Other (M/G, Unix and Repicci) Unicompartmental Knee Prostheses



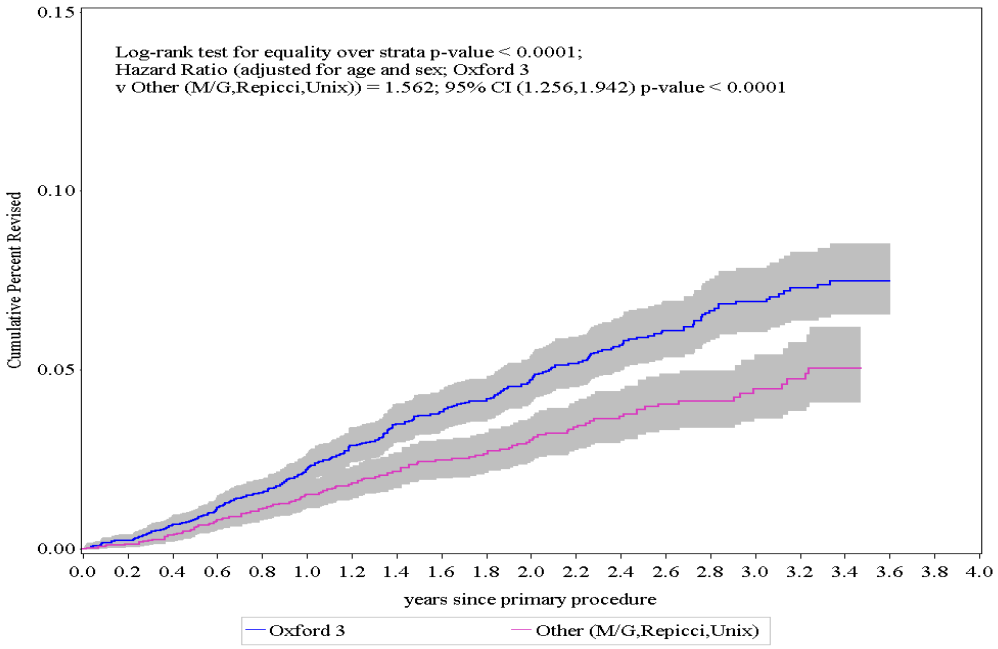
	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Other (M/G Unix Repicci)	3990	3495	2982	2477	1941	1353	816	373	113
Allegretto Uni Knee	1238	1123	1014	869	668	498	317	178	93

Figure K15: Cumulative percentage of Revision of Natural Unicompartmental Knee and Other (M/G, Unix and Repicci) Unicompartmental Knee Prostheses



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Other (M/G Unix Repicci)	3990	3495	2982	2477	1941	1353	816	373	113
Natural Uni Knee	139	132	116	93	74	51	37	20	3

Figure K16: Cumulative percentage of Revision of Oxford 3 Unicompartmental Knee and Other (M/G, Unix and Repicci) Unicompartmental Knee Prostheses



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Oxford 3	5471	4912	4246	3596	2833	2059	1308	702	322
Other (M/G Unix Repicci)	3990	3495	2982	2477	1941	1353	816	373	113

Figure K17: Cumulative percentage of Revision of Preservation Fixed and Other (M/G, Unix and Repicci)

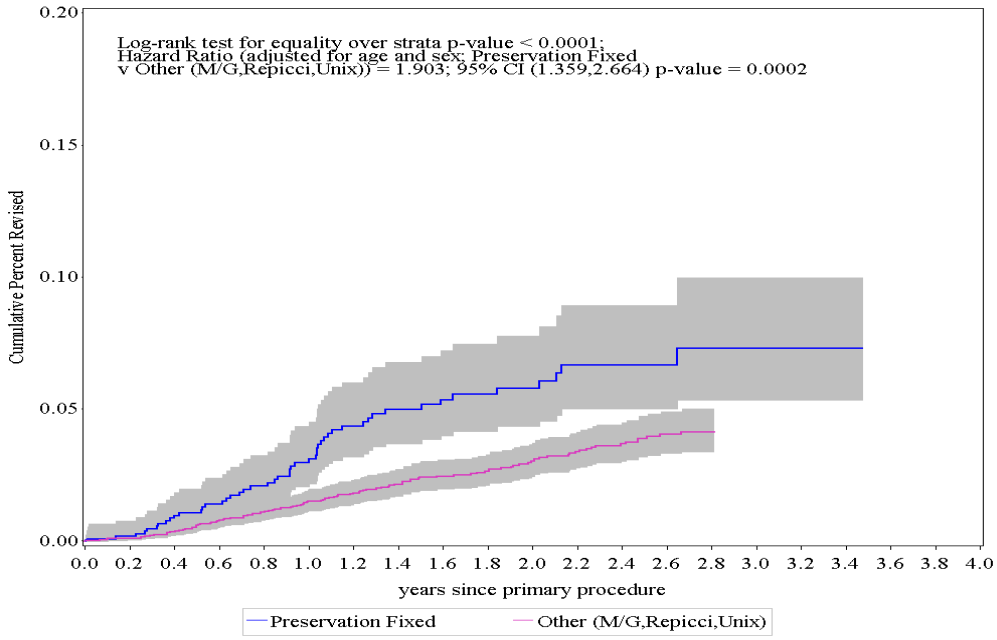


Figure K18: Cumulative percentage of Revision of Preservation Mobile and Other (M/G Unix and Repicci)

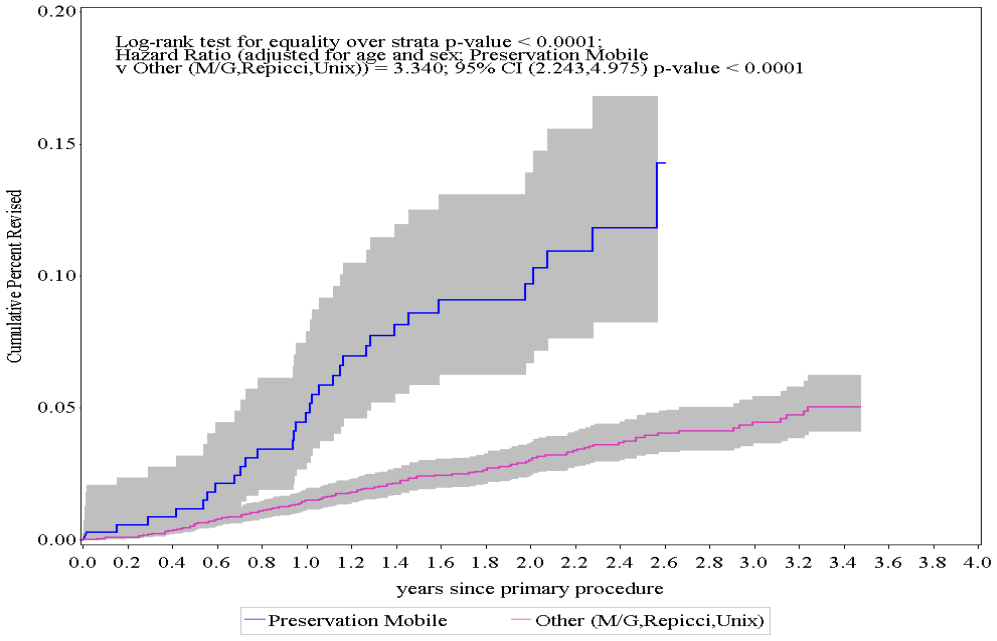
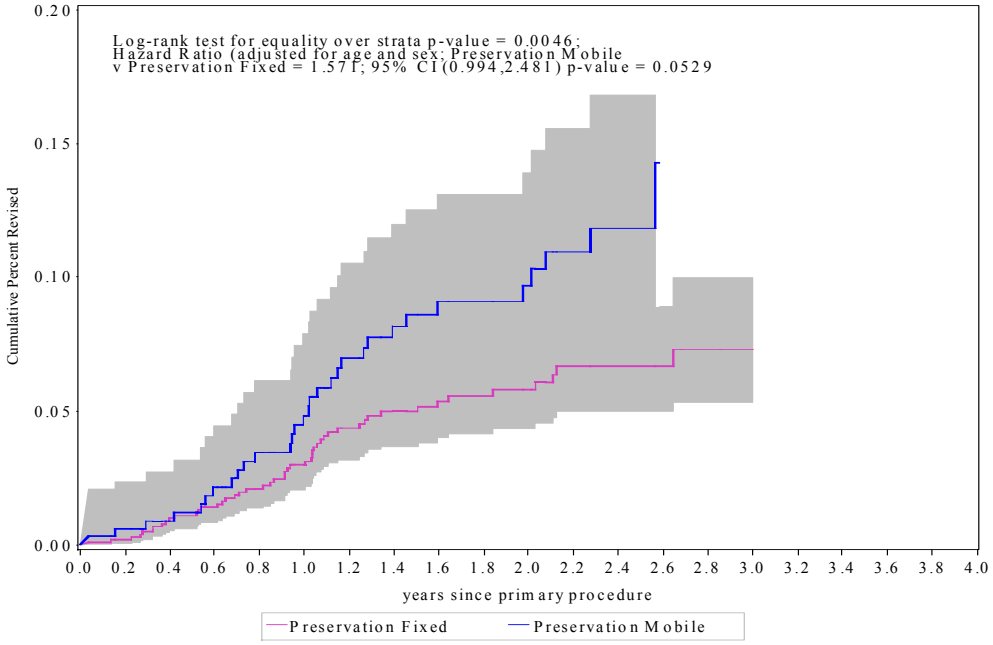


Table K20: Preservation Unicompartmental Primary Knee Procedures requiring Revision

Unicompartmental	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Preservation-Fixed	49	1098	4.5	1665	2.9	(2.18, 3.89)
Preservation-Mobile	33	343	9.6	584	5.7	(3.89, 7.94)
Total	**82**	**1441**	**5.7**	**2249**	**3.6**	**(2.90, 4.53)**

Figure K19: Cumulative percentage of Revision of Preservation Fixed and Preservation Mobile Unicompartmental Knee Prostheses



	Number at risk at start of the period							
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*
Preservation-Fixed	1098	930	720	529	348	178	77	11
Preservation-Mobile	343	317	272	205	146	45	10	0

Table K21: Comparison of one year revision rate for Preservation Unicompartmental Fixed and Mobile procedures undertaken in 2002 and 2003

	Number Revised	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
	Procedures performed in 2002					
Preservation-Fixed	12	294	4.1	289	4.2	(2.15, 7.26)
Preservation-Mobile	7	149	4.7	147	4.8	(1.91, 9.79)
Total	**19**	**443**	**4.3**	**436**	**4.4**	**(2.62, 6.80)**
	Procedures performed in 2003					
Preservation-Fixed	11	371	3.0	367	3.0	(1.50, 5.37)
Preservation-Mobile	4	121	3.3	119	3.4	(0.91, 8.59)
Total	**15**	**492**	**3.0**	**486**	**3.1**	**(1.73, 5.09)**

Preservation-Fixed (2002 v 2003; adjusted for age and sex): HR=1.412 (0.623,3.203) p=0.4085
Preservation-Mobile (2002 v 2003; adjusted for age and sex): HR=1.454 (0.426,4.967) p=0.5506

Preservation-Combined (2002 v 2003; adjusted for age and sex): HR=1.420 (0.721,2.797) p=0.3099

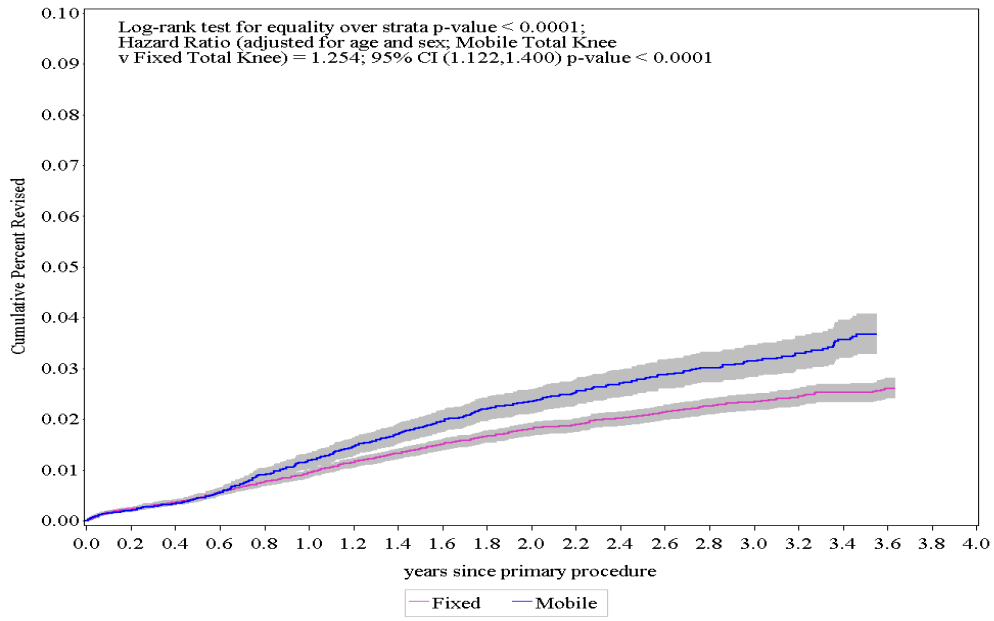
**** Note:*** all procedures have maximum 1 year follow-up. Revisions performed after 1 year are not included in this analysis and component years are censored at 1 year following primary operation.

Table K22: 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	907	57552	1.6	109871	0.8	(0.77, 0.88)
Mobile	487	23587	2.1	44254	1.1	(1.00, 1.20)
Total	**1394**	**81139**	**1.7**	**154124**	**0.9**	**(0.86, 0.95)**

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

Figure K20: Cumulative percentage of Revision of Fixed and Mobile



	Number at risk at start of the period								
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*
Fixed	57552	49151	40924	33432	25677	18893	12084	6898	3265
Mobile	23587	20167	16500	13376	10281	7571	4814	2553	1211

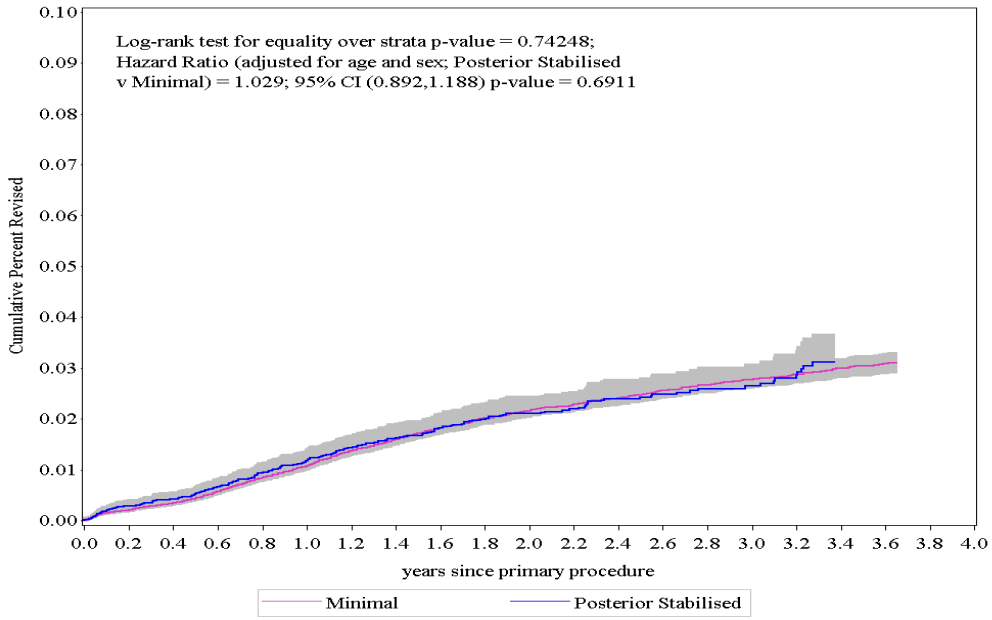
Table K23: Total Primary Knee Procedures requiring Revision by Movement

Movement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*
Fixed	951	57728	1.6	110136	0.86
Rotating	486	19968	2.4	36052	1.35
Rotating - Sliding	51	2961	1.7	5640	0.90
Sliding	27	876	3.1	2877	0.94
Unknown	1	28	3.6	78	1.28
Total	**1516**	**81561**	**1.9**	**154783**	**0.98**

Table K24: Total Primary Knee Procedures requiring Revision by Stability

Stability	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*
Minimal	1283	67919	1.9	132261	0.97
Posterior Stabilised	220	13210	1.7	21664	1.02
Fully Stabilised	6	276	2.2	538	1.12
Hinged	6	126	4.8	240	2.50
Unknown	1	30	3.6	78	1.28
Total	**1516**	**81561**	**1.9**	**154783**	**0.98**

Figure K21: Cumulative percentage of Revision of Posterior Stabilised and Minimal

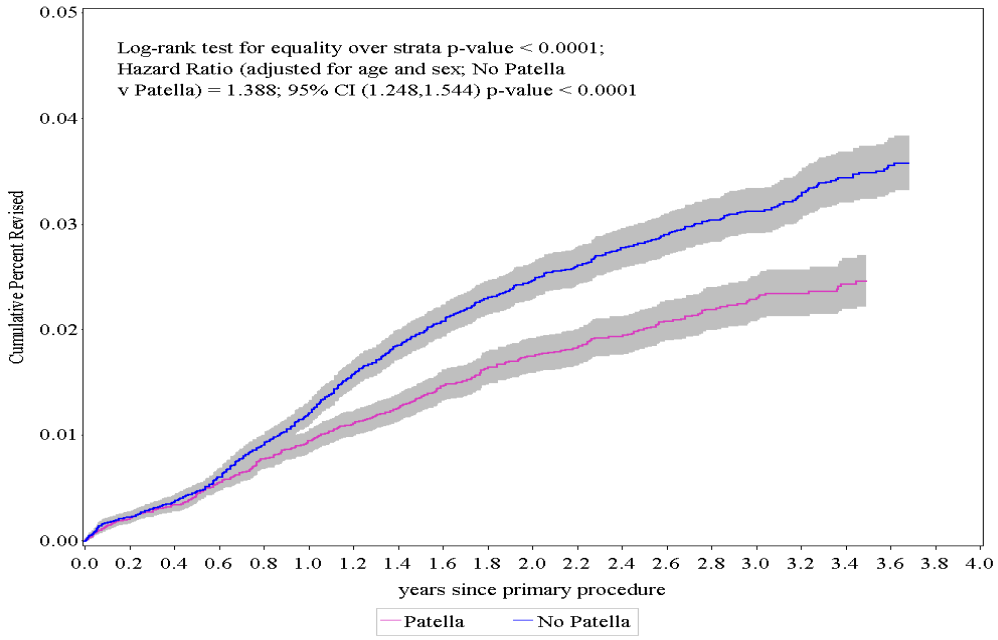


	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***	***3.5***	***4.0***
Minimal	67919	58750	49175	40392	31157	23056	14858	8278	3962
Posterior Stabilised	13210	10596	8280	6408	4661	3274	1956	1120	493

Table K25: Revision rates for Primary total knee replacements requiring revision by Patella Use

Tibial Component	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Patella Not Used	996	46637	2.1	90258	1.1	(1.04, 1.17)
Patella Used	520	34924	1.5	64525	0.8	(0.74, 0.88)
Total	**1516**	**81561**	**1.9**	**154783**	**1.0**	**(0.93, 1.03)**

Figure K22: Cumulative percentage of Revision of Primary total knee replacements by Patella Use



	Number at risk at start of the period								
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*
Patella Not Used	46637	39996	33268	27260	20980	15614	10188	5989	3028
Patella Used	34924	29735	24523	19821	15047	10850	6710	3462	1448

Table K26: Total Primary Knee Procedures requiring Revision

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
AGC	AGC	38	2518	1.5	5728	0.7	(0.47, 0.91)
Active Knee	Active Knee	24	1646	1.5	1875	1.3	(0.82, 1.90)
Advance	Advance	24	724	3.3	1578	1.5	(0.97, 2.26)
Advantim	Advantim	6	483	1.2	1443	0.4	(0.15, 0.91)
Duracon	Duracon	200	11059	1.8	22442	0.9	(0.77, 1.02)
Genesis II	Genesis II	152	8125	1.9	14337	1.1	(0.90, 1.24)
Genesis II	Mobile Bearing	68	934	7.3	2106	3.2	(2.51, 4.09)
Kinemax Plus	Kinemax Plus	24	1343	1.8	3219	0.7	(0.48, 1.11)
LCS	LCS	198	7613	2.6	18854	1.1	(0.91, 1.21)
LCS	MBT	72	5371	1.3	7414	1.0	(0.76, 1.22)
Maxim	Maxim	37	1574	2.4	2674	1.4	(0.97, 1.91)
Natural Knee	Natural Knee	50	3030	1.7	5807	0.9	(0.64, 1.14)
Nexgen	Nexgen	83	8275	1.0	15430	0.5	(0.43, 0.67)
Nexgen LPS	Nexgen	45	3209	1.4	6390	0.7	(0.51, 0.94)
Nexgen LPS Flex	Nexgen	14	2040	0.7	1850	0.8	(0.41, 1.27)
Nexgen MBK	Nexgen MBK	13	475	2.7	1368	1.0	(0.51, 1.62)
PFC Sigma	PFC Sigma	99	6115	1.6	10857	0.9	(0.74, 1.11)
Profix	Mobile Bearing	66	977	6.8	1427	4.6	(3.58, 5.88)
Profix	Profix	65	2814	2.3	4802	1.4	(1.04, 1.73)
RBK	RBK	15	1173	1.3	1741	0.9	(0.48, 1.42)
Scorpio	Scorpio	55	2764	2.0	4846	1.1	(0.86, 1.48)
Scorpio	Series 7000	63	4637	1.4	8812	0.7	(0.55, 0.91)
Others (81)	-	105	4662	2.3	9786	1.1	(0.88, 1.30)
Total	**-**	**1516**	**81561**	**1.9**	**154783**	**1.0**	**(0.93, 1.03)**

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

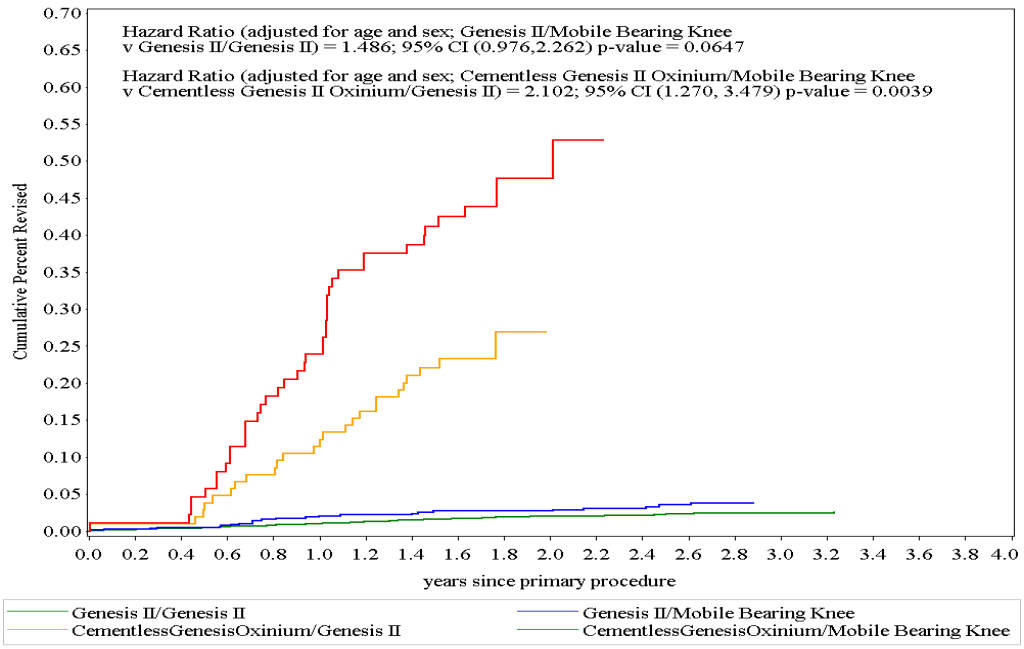
Table K27: Total Primary Knee Procedures requiring Revision
Least revised over 5000 observed component years

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Nexgen	Nexgen	83	8275	1.0	15430	0.5	(0.43, 0.67)
LCS	MBT	72	5371	1.3	7414	1.0	(0.76, 1.22)
Nexgen LPS	Nexgen	45	3209	1.4	6390	0.7	(0.51, 0.94)
Scorpio	Series 7000	63	4637	1.4	8812	0.7	(0.55, 0.91)
AGC	AGC	38	2518	1.5	5728	0.7	(0.47, 0.91)

Table K28: Revision rates for Genesis II Femoral component by Tibial component

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Genesis II	Genesis II	121	7481	1.6	13854	0.9	(0.72, 1.04)
Genesis II	Mobile Bearing Knee	27	846	3.2	1982	1.4	(0.90, 1.98)
Cementless Genesis II Oxinium	Genesis II	25	105	23.8	156	16.1	(10.40, 23.72)
Cementless Genesis II Oxinium	Mobile Bearing Knee	41	88	46.6	124	33.0	(23.70, 44.81)

Figure K23: Cumulative percentage of Revision of Genesis II Total knee Prosthesis

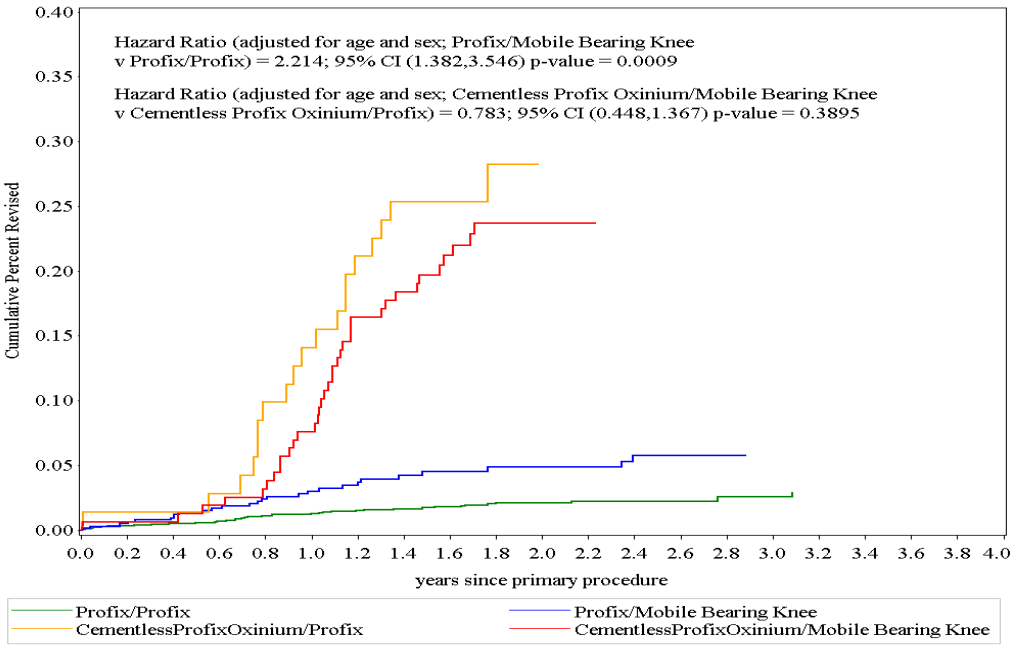


Femoral	*Tibial*	*Number at risk at start of the period*								
		0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*
Genesis II	Genesis II	7481	6234	5063	4062	3192	2443	1630	927	385
Genesis 11	Mobile Bearing Knee	846	766	663	561	518	425	315	192	98
Cementless Genesis II Oxinium	Genesis II	105	102	93	71	2	0	0	0	0
Cementless Genesis II Oxinium	Mobile Bearing Knee	88	84	67	45	10	0	0	0	0

Table K29: Revision rates for Profix Femoral component by Tibial component

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Profix	Profix	46	2726	1.7	4681	1.0	(0.72, 1.31)
Profix	Mobile Bearing Knee	29	819	3.5	1158	2.5	(1.68, 3.60)
Cementless Profix Oxinium	Profix	19	71	26.8	110	17.3	(10.42, 27.02)
Cementless Profix Oxinium	Mobile Bearing Knee	37	158	23.4	269	13.7	(9.67, 18.93)

Figure K24: Cumulative percentage of Revision of Profix Total Knee Prosthesis



Femoral	*Tibial*	*Number at risk at start of the period*								
		0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*	*3.5*	*4.0*
Profix	Profix	2726	2300	1862	1418	1033	701	389	218	117
Profix	Mobile Bearing Knee	819	640	457	320	258	181	54	6	0
Cementless Profix Oxinium	Profix	71	71	61	44	7	0	0	0	0
Cementless Profix Oxinium	Mobile Bearing Knee	158	156	146	113	50	0	0	0	0

AOA National Joint Replacement Registry
Cement Data

Introduction

This section details the use of cement in hip and knee replacement for both primary and revision surgery for the period 1/9/99 to 31/12/2004. It has not been possible with the data available to identify any statistically significant difference in outcomes in primary procedures using cement with or without antibiotic.

Cement Use in Hip Replacement

Table C1 presents information on the use of cement in primary partial and total hip replacements. Cement use for both the femoral and acetabular components has been identified separately. The four most common cements account for 73.0% of all cemented femoral stem fixation for primary and revision procedures. In primary acetabular fixation the top four cements account for 64.2%. Antibiotic cement is used in 61.3% of primary total hip replacement procedures when cement is used.

Where cement is used for revision, antibiotic cement is used in 81.5% of procedures.

Cement Use in Knee Replacement

Antibiotic cement is used in 61.1% of primary knee procedures (Table C3). It is used in almost 83.5% of revision knee procedures.

Palacos R, CMW1g, Antibiotic Simplex and Simplex Tobra are the most common cements used in revision knee procedures. (Table C4). The proportional use of Palacos R however has declined considerably over the last 12 months for both primary and revision knee replacement (all cemented primary prostheses decreased from 19.1% to 14.3%, all cemented revision prostheses decreased from 24.6% to 19.1%).

Number of Different Types of Cement Used

There are a small number of different types of cement used for the majority of procedures. However 30 different cements have been reported, an increase from the 26 reported in the 2003 Report. Many of these have only been used in a small number of cases.

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

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Simplex P	12736	30.3	CMW 1 Plain	2146	19.8
Antibiotic Simplex*	8391	20.0	Simplex P	1726	16.0
Simplex Tobra*	6597	15.7	Simplex Tobra*	1637	15.1
CMW 1 Plain	2986	7.1	Palacos R*	1440	13.3
Palacos R*	2781	6.6	Antibiotic Simplex*	1122	10.4
CMW 1G*	2365	5.6	CMW 1G*	969	9.0
CMW 3G*	1144	2.7	CMW 2G*	630	5.8
Palacos E*	1133	2.7	CMW 2 Plain	541	5.0
Palamed G*	658	1.6	Palamed G*	314	2.9
CMW 3 Plain	637	1.5	CMW 3G*	80	0.7
Other types (24)	2603	6.2	Other types (19)	212	2.0
Total	**42031**	**100.0**	**Total**	**10817**	**100.0**

Note: *primary hip replacement does not include resurfacing and thrust plates*
*more than one type of cement was used in some procedures, * denotes cement with antibiotic*

Table C2: Revision Hip Replacement - Top Ten Cements used by Location

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Antibiotic Simplex*	720	25.3	CMW 1G*	646	21.8
Simplex Tobra*	675	23.7	Palacos R*	571	19.3
Simplex P	389	13.7	Simplex Tobra*	454	15.4
Palacos R*	304	10.7	Antibiotic Simplex*	410	13.9
CMW 1G*	238	8.4	CMW 1 Plain	242	8.2
CMW 1 Plain	123	4.3	Simplex P	170	5.7
Palamed G*	97	3.4	CMW 2G*	163	5.5
CMW 3G*	79	2.8	Palamed G*	143	4.8
Palacos E*	62	2.2	CMW 2 Plain	79	2.7
CMW 3 Plain	31	1.1	CMW 3G*	22	0.7
Other types (17)	125	4.4	Other types (13)	57	1.9
Total	**2843**	**100.0**	**Total**	**2957**	**100.0**

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

Table C3: Primary Knee Replacement - Top Ten Cements used by Location

Femur	*N*	*%*	*Tibia*	*N*	*%*	*Patella*	*N*	*%*
Palacos R*	8425	15.7	Simplex P	10271	13.7	Antibiotic Simplex*	4597	13.9
CMW 1G*	7726	14.4	CMW 1 Plain	10141	13.6	Palacos R*	4588	13.9
CMW 1 Plain	7053	13.1	Palacos R*	10109	13.5	CMW 2 Plain	3947	11.9
Simplex P	6926	12.9	CMW 1G*	10092	13.5	CMW 1 Plain	3871	11.7
Antibiotic Simplex*	5984	11.1	CMW 2 Plain	8239	11.0	Simplex P	3863	11.7
Palamed G*	4496	8.4	Antibiotic Simplex*	7917	10.6	CMW 1G*	3790	11.5
Simplex Tobra*	4266	7.9	Simplex Tobra*	6068	8.1	Simplex Tobra*	3084	9.3
CMW 2 Plain	4252	7.9	Palamed G*	5175	6.9	Palamed G*	2589	7.8
CMW 2G*	3022	5.6	CMW 2G*	4390	5.9	CMW 2G*	1593	4.8
CMW 3G*	284	0.5	CMW 3G*	554	0.7	Cemex Gent HV*	244	0.7
Other types (21)	1334	2.5	Other types (20)	1883	2.5	Other types (19)	869	2.6
Total	**53768**	**100.0**	**Total**	**74839**	**100.0**	**Total**	**33035**	**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*	*%*
Palacos R*	942	20.8	CMW 1G*	1113	21.1	CMW 2 Plain	624	16.2
CMW 1G*	931	20.6	Palacos R*	1039	19.7	Palacos R*	619	16.0
Antibiotic Simplex*	632	14.0	Antibiotic Simplex*	693	13.2	CMW 1G*	612	15.9
Simplex Tobra*	505	11.2	Simplex Tobra*	560	10.6	Antibiotic Simplex*	424	11.0
Palamed G*	388	8.6	Palamed G*	399	7.6	Simplex Tobra*	340	8.8
CMW 2G*	290	6.4	CMW 2G*	355	6.7	CMW 2G*	336	8.7
Simplex P	259	5.7	CMW 1 Plain	315	6.0	Simplex P	304	7.9
CMW 1 Plain	237	5.2	CMW 2 Plain	299	5.7	CMW 1 Plain	265	6.9
CMW 2 Plain	185	4.1	Simplex P	294	5.6	Palamed G*	209	5.4
CMW 3G*	36	0.8	CMW 3G*	49	0.9	CMW 3G*	32	0.8
Other types (14)	115	2.5	Other types (16)	152	2.9	Other types (14)	94	2.4
Total	**4520**	**100.0**	**Total**	**5268**	**100.0**	**Total**	**3859**	**100.0**

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

Mortality Following Joint Replacement Surgery

Introduction

Mortality information has been obtained by matching Registry data with the National Death Index (NDI), a database maintained by the Australian Institute of Health and Welfare (AIHW). Access by the Registry to this database has been obtained following approval of an application to the AIHW.

In previous reports the Registry was only able to obtain NDI data for the period ending 12 months prior to the procedure data relevant for that report (e.g.) in the 2004 Report, the NDI data ended at 31st December 2002 where as prostheses data was to the 31st December 2003. This year the Registry has been able to obtain NDI data to the 31st December 2004. This now corresponds to the same period of procedure data collection. This has resulted in the addition of two years mortality data over the last twelve months. The changes in the available data are reflected in the analyses of the mortality figures.

Analysis and Presentation of Mortality data

Adjusted mortality is obtained after direct standardisation of the crude cumulative mortality data by 5-year age intervals and by sex to the Estimated Resident Population Status based on the 2001 census. As the total population has a younger age structure than that of the subjects in the Registry, the adjusted mortality is substantially lower than the crude mortality. By minimising the effects of differences in age and sex among groups, the adjusted measure may be used to compare the mortality of different procedures and will become useful in comparing mortality over time.

The rate per 100 person years has been calculated from the date of procedure to either the date of death or the date of the end of the valid death search by the Australian Institute of Health and Welfare (December 31, 2004). 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

As previously reported mortality associated with hip replacement varies depending on the type of hip replacement procedure that has been undertaken. Mortality is least for primary total hip replacement. The probability of surviving at one year is 74% for partial hip replacement (95% CI 73.3, 74.7), 98.2% for primary total hip replacement (95% CI (98.0, 98.3). These figures are for all diagnoses including those that are likely to be associated with a high mortality such as malignancy (Table M1 and Figure M1).

As would be anticipated, the crude cumulative mortality of primary partial hip procedures is 34.8% compared to primary total hips of 3.9%. The mortality rate per 100 person years is also higher in primary partial compared to primary total hip (24.1 and 2.0 respectively). This difference is not eliminated after adjusting for age and sex; standardised mortality is 20.6% for partial hips and 1.5% for total hips (SMR = 14). The risk of death for partial hip replacement is 6.3 times greater than primary total hips (hazard ratio =6.258; 95% CI (5.923, 6.612) p– value<0.0001) (Table M1 and Figure M1). The principal diagnosis for primary partial hip is fractured neck of femur and this group is vastly different with respect to associated co-morbidities and other factors that may contribute to mortality compared to primary total hip.

There are also differences when comparing different types of partial hip replacement (Figure M2). Cumulative mortality and rate per 100 person years are increased in unipolar monoblock prostheses compared to unipolar modular and bipolar prostheses. After correcting for age and sex the differences are not as evident (Table M2). There is a difference in mortality when the two principal types of unipolar monoblock prostheses are compared. The use of the Austin Moore prosthesis is associated with an increased mortality compared to the

Thompson prosthesis (Table M2 and Figure M3).

There is a difference in mortality between primary and revision hip procedures. The crude mortality for primary total hips is 4.2% and for revisions, 8.0%. After standardisation for age and gender there is still a difference in the mortality rate for each procedure, 1.66% for primary hips and 2.26% for revisions (Table M2).

Mortality Associated with Knee Replacement including same day bilateral procedures

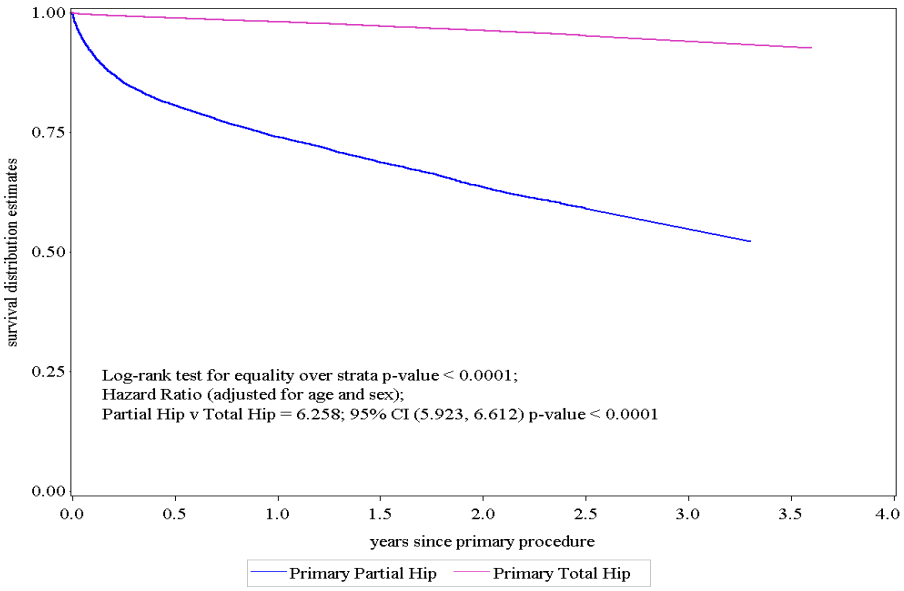
The mortality figures for the different knee replacement procedures indicate that there is a trend towards increased mortality related to the extent of the procedure undertaken. Three deaths have been identified during the period of observation for patellar/trochlear procedures. Mortality is less following 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 1.6 times greater than unicompartmental knees (hazard ratio = 1.635; 95% CI (1.412, 1.893) p – value < 0.0001) (Table M 3 and Figure M 4).

Table M1: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2004

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	5832	16751	34.8	20.5853	24219	24.08	(23.47, 24.71)
Primary Total Hip	2515	63688	3.9	1.4915	124892	2.01	(1.94, 2.09)
Revision Hip	714	8909	8.0	2.2611	18626	3.83	(3.56, 4.13)
Total	9061	89348	10.1	2.8287	167737	5.40	(5.29, 5.51)

Note: *Primary Total includes resurfacing and Thrusts plates.*

Figure M1: Kaplan-Meier Survival - following Hip Procedure

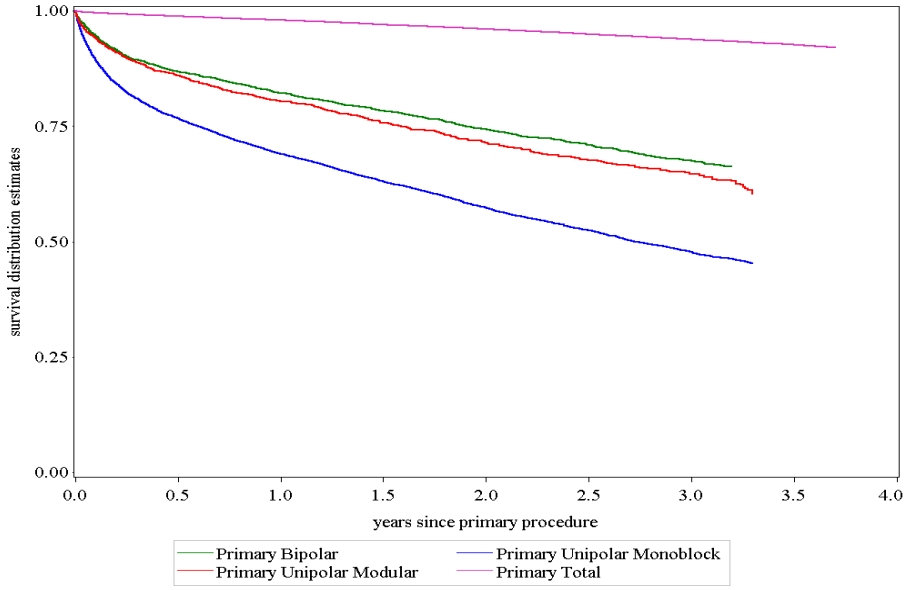


	Number at risk at start of the period								
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*
Primary Partial Hip	16751	11716	9125	6973	5165	3552	2256	1269	598
Primary Total Hip	63688	54908	46211	38095	29761	21916	14397	8241	3701

Table M2: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2004 (Table M1 expanded)

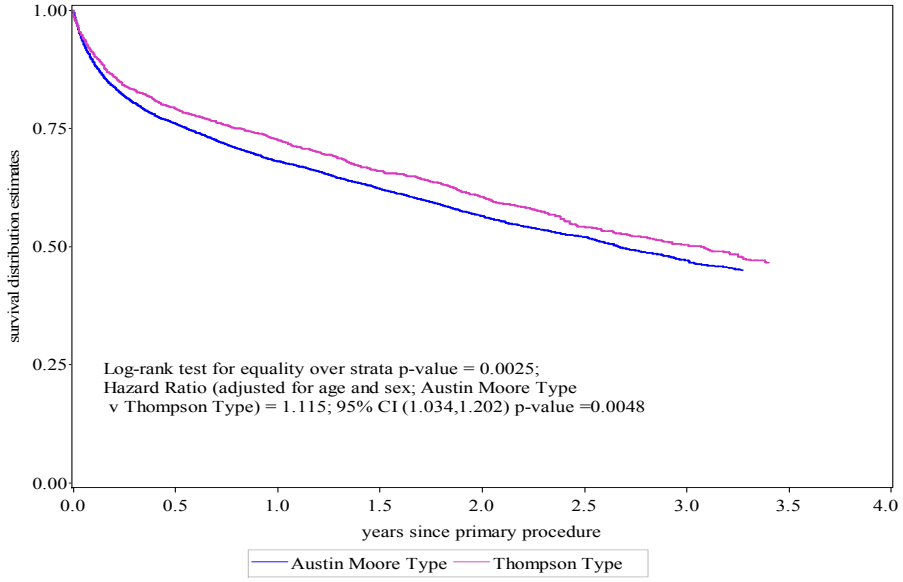
Type of hip replacement	*Number who died*	*Number of patients*	*Cumulative mortality (% who died)*	*Standardised Mortality*	*Person-years*	*Rate per 100 person years*	*Exact 95% CI*
Primary Bipolar	1089	4570	23.8	19.9713	7057	15.43	(14.53, 16.38)
Primary Unipolar Mono	4185	9994	41.9	11.4667	14095	29.69	(28.80, 30.61)
Austin-Moore Type	3333	7792	42.8	11.0734	10919	30.53	(29.50, 31.58)
ETS	3	38	7.9	0.7323	10	29.31	(6.04, 85.64)
Thompson Type	849	2164	39.2	13.3520	3166	26.82	(25.04, 28.68)
Primary Unipolar Modular	558	2187	25.5	12.2468	3068	18.19	(16.71, 19.76)
Primary Resurfacing	23	4780	0.5	0.2167	8357	0.28	(0.17, 0.41)
Primary Thrust Plate	1	94	1.1	0.9753	239	0.42	(0.01, 2.33)
Primary Total	2491	58814	4.2	1.6638	116296	2.14	(2.06, 2.23)
Revision	714	8909	8.0	2.2611	18626	3.83	(3.56, 4.13)
Total	**9061**	**89348**	**10.1**	**2.8287**	**167737**	**5.40**	**(5.29, 5.51)**

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



	Number at risk at start of the period								
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*	*4*
Primary Partial Hip	4570	3424	2725	2118	1547	1007	595	327	168
Primary Total Hip	9994	6741	5217	4018	3019	2120	1366	775	351
Revision Hip	2187	1551	1183	837	599	425	295	167	79
Primary Total Hip	58814	50783	42803	35375	27719	20564	13644	7906	3594

Figure M3: Kaplan-Meier Survival - following Unipolar Monoblock Primary

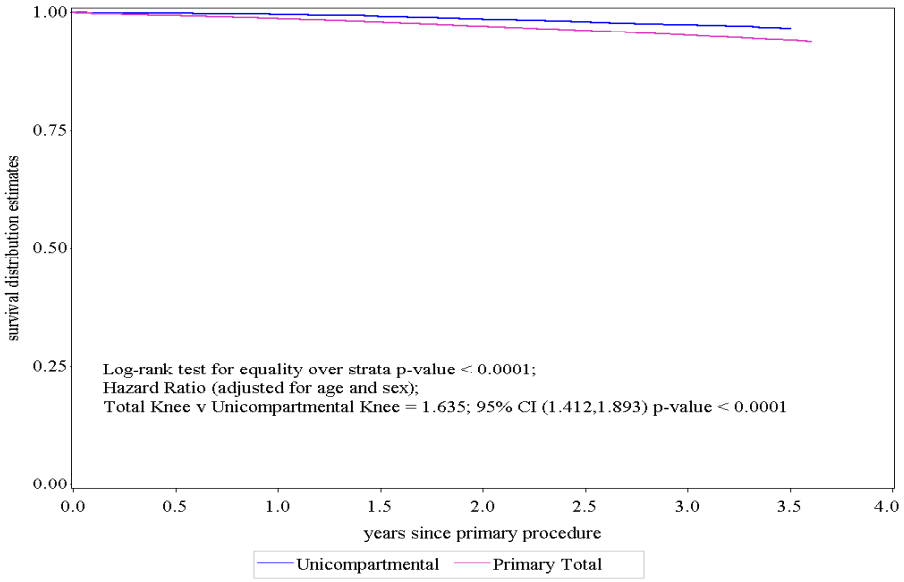


	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3***	***3.5***	***4***
Austin-Moore Type	7792	5252	4052	3125	2337	1634	1035	578	247
Thompson Type	2164	1485	1165	893	682	486	331	197	104

Table M3: Number and percentage of people who died following Knee Replacement for Knee procedure between September 1999 and December 2004

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	3	406	0.7	0.29223	718	0.42	(0.09, 1.22)
Unicompartmental	196	12330	1.6	0.55809	24255	0.81	(0.70, 0.93)
Primary Total	2190	68443	3.2	7.94776	133472	1.64	(1.57, 1.71)
Revision	312	5506	5.7	1.16094	12294	2.54	(2.26, 2.84)
Total	**2701**	**86685**	**3.1**	**7.51900**	**170739**	**1.58**	**(1.52, 1.64)**

Figure M4: Kaplan-Meier Survival - following Knee Procedure



	Number at risk at start of the period								
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3***	***3.5***	***4***
Patella/trochlear	406	338	278	213	154	103	75	45	22
Unicompartmental	12330	10868	9320	7639	5880	4159	2601	1315	571
Primary Total	68443	59096	49551	40882	31564	23369	15009	8426	3964

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.

Hazard Rate: A measure of the instantaneous risk of occurrence of an event, for example death, at a point in time, t. It is sometimes called the "force of mortality". A hazard ratio results from dividing one group's hazard by another's to give a comparative measure of the instantaneous risk of experiencing the event of interest.

Incidence Rate: The number of new occurrences of an event divided by a measure of the population at risk of that event over a specified time period. The population at risk is often given in terms of person-time: for example, if 6 persons are each at risk over 4 months, they contribute 6 x 1/3 = 2 person-years to the denominator of the incidence rate. The incidence rate ratio (IRR) is commonly used to compare the incidence rates of two groups. If the two groups incidence rates are the same, an IRR of 1 results.

Log Rank Test: A family of statistical tests that compares the survival experience of two or more groups over the entire time of observation (contrast with comparison of survival at a defined time, for example, five-year survival.)

Survival Curve: A plot of the proportion of subjects who have not yet experienced a defined event (for example death, revision of prosthesis) versus time. The Kaplan-Meier method is the one most commonly used. The curve takes account of subjects whose ultimate survival time is not known, a phenomenon called "**censoring**". The survival estimate at each time is accompanied by a confidence interval based on the method of Greenwood. An interval is interpretable only at the time for which it was estimated and the sequence of intervals (depicted as shading on the Kaplan-Meier curve) cannot be used to judge the significance of any perceived difference over the entire time course.

Appendix 2

PATIENT CONSENT AND CONFIDENTIALITY GUIDELINES

Patient Consent

The Registry obtains consent to include information from individuals undergoing joint replacement. This is done by using the 'opt off' approach. The implementation of the new Commonwealth Legislation at the end of 2001 resulted in the Registry meeting the Privacy Commission to ensure that the system used for patient consent is within the privacy guidelines.

Using this approach, patients are provided with a Patient Information Sheet. This explains what information is required, how it is collected and the avenues to take should an individual not want their information included in the Registry. The information is clearly explained. The information is provided to patients by surgeons and hospitals prior to surgery. To accommodate those patients that may wish to opt off, or have enquires or issues to discuss, a freecall number *(no cost to the patient*) has been implemented at the Registry.

Patient Confidentiality

Joint replacement patients will not be contacted directly by the Registry. No individual patient will be identified during analysis or in the reports and publications produced by the Registry. Patient operative and prostheses data will be managed in accordance with the Guidelines for the Protection of Privacy in the Conduct of Medical Research. Personal data collected are for use by the AOA National Joint Replacement Registry only. Further to this the Registry is a Federal Quality Assurance Activity *(see below)* and all information is protected.

Data Management & Confidentiality

The Data Management and Analysis Centre, University of Adelaide undertakes data entry, validation and analysis and provides secure data storage.

The DMAC was established in 1995. Dr Philip Ryan, Associate Professor in Public Health, heads the DMAC. The centre staff includes data managers, database programmers, statisticians and data assistants from the Department of General Practice and the Department of Public Health. It is engaged in an increasing variety of work, including clinical trials, pharmacoepidemiological studies, consultations and cohort studies.

The list of personnel with access to identified Registry information is as follows:

- Chairman Dr. David Davidson
- Director Professor Stephen Graves
- Coordinator Ms Lisa Ingerson
- Data Management and Analysis Centre Staff including data assistants and data manager, statisticians and programmers.

Declaration of the project as a Quality Assurance Activity ensures that Registry and DMAC staff are bound to maintain confidentiality. Confidentiality not only applies to individual patients but also includes surgeons and hospitals.

The DMAC has security systems to limit access to DMAC and Registry staff only. There are policies and procedures in place as well as software barriers to protect personal information. These include the use of codes, passwords and encryption.

The proforma used for data collection will be stored in a secure locked room at the DMAC. After a period of time the forms will be scanned and electronically stored. As with all data these will be securely stored. All data will be retained in accordance with good scientific practice.

Surgeon Confidentiality

Surgeon confidentiality is assured. The purpose of the Registry is to provide demographic and outcome information relevant to joint replacement surgery. It is not designed or capable of monitoring the performance of individual surgeons. Surgeon name is not recorded in the Registry database. In addition to this, the AOA Registry Management Committee made a decision in October 1999 to remove surgeon name from any Registry forms. The Board of the AOA ratified this decision. As a consequence of this, Registry staff blackout surgeon name, whether it is hand written or printed on the hospital patient identification, on all forms received by the Registry.

It has always been thought however, that it is an important Registry function to provide a service to surgeons that allows them to monitor and audit their own performance. It is for this reason that surgeons have a choice to identify themselves by code. In this manner specific procedures can be linked with that code. This is an optional choice and there is no requirement that the surgeon code be completed. The codes are provided to surgeons by the AOA and Registry staff do not have access to those codes.

The intention is to provide surgeons with access to their own information through secure internet access. As yet the software has not been developed that would allow this to occur. It is important to emphasise that surgeons have the choice of using their code and that surgeon name is not recorded and also permanently removed from any of the Registry forms.

Federal Quality Assurance Activity

The Australian Orthopaedic Association National Joint Replacement Registry was declared a Federal Quality Assurance Activity by the then Federal Minister for Health and Aged Care, Dr Wooldridge, in March 1999 and again in November 2001. This ensures freedom from subpoena and absolute confidentiality of information held by the Registry.

The Quality Assurance legislation is part of the Health Insurance Act of 1973. This act was amended in 1992 to include quality assurance confidentiality. The Act operates on the underlying assumption that quality assurance activities are in the public interest.

A declaration as a quality assurance activity by the Commonwealth Minister of Health and Aged Care prohibits the disclosure of information, which identifies individual patients or health care providers that is known solely as a result of the declared quality assurance activity. It is not possible to provide identifying information to any individual or organisation including the government.

The protection provided by the declaration assures surgeons, hospitals and government that information supplied to the Registry remains confidential and secure. The act also protects persons engaging in those activities in good faith from civil liability in respect of those activities.

The declaration of the Registry as a Quality Assurance Activity is for an initial five-year period but covers information collected during this period indefinitely.

Appendix 3

AUSTRALIAN ORTHOPAEDIC ASSOCIATION
NATIONAL JOINT REPLACEMENT REGISTRY

PATIENT INFORMATION

INTRODUCTION - *about the Registry*

You are about to have a joint replacement. Joint replacement is very successful and most people do not require any further surgery following this procedure. However, a number of people who have a joint replacement may at some time in the future require another operation on that joint. This may occur due to a variety of reasons; the most common being that the joint replacement has worn out. Furthermore, differences between the many types of artificial joints available may affect the time at which they wear out and require replacing. In order to improve the success of this surgery, the Australian Orthopaedic Association has set up a National Joint Replacement Registry so that joint replacement and prostheses can be monitored.

The purpose of the Registry is to assess the performance of all joint replacement. If a joint replacement is identified as having a problem, the Registry can assist hospitals to locate those people that may be effected. To do this it is important to record information on every person having a joint replacement. Approximately 50,000 people have joint replacement surgery each year in Australia. It is also important to record details on any subsequent operations and the reason the surgery was performed. By analysing this information it will be possible to identify the cause of any problems as well as determine which types of joint replacement have the best results. To be successful, the Registry needs to gather information on as many people having hip or knee replacement surgery as possible. We are asking you to participate in the Registry, by allowing us to document information relevant to your operation.

Your Involvement - *the information we need*

The information we require includes your name, date of birth, address, Medicare number, hospital identity number, the name of the hospital and the reason you are having a joint replacement. This information is necessary to accurately link you to the artificial joint inserted as well as linking any following joint surgery you may have, to your previous records. We will also record the day of the operation, which joint was operated on and the type of artificial joint used. No other personal information is recorded. Hospitals and government will send reports to the Registry on a regular basis to validate the information collected.

Information - *how we will keep your information confidential*

Your personal information is confidential and cannot be used outside the Registry. Procedures are in place to protect your information and to keep it confidential. When your details have been entered into the Registry your record will be given a specific Registry number. In addition you cannot be identified in any reports produced by the Registry.

How we will collect the information

Although we are asking to record your operation details in the Registry you are not required to do anything. Your surgeon and/or theatre staff will complete the form that contains your personal details at the time of your operation and send it to us. The information will be entered into the Registry computer.

Risks and Benefits - *to you*

There are no risks to you by having your details in the Registry. Your information is protected and we are not allowed to identify you by law.

The Registry will produce general reports on a variety of factors that influence the success of joint replacement surgery. This will improve the quality of future joint replacement surgery.

What to do if you don't want to be in the Registry

We understand that not everyone is comfortable about having his or her personal details documented in a Registry. If you feel this way and do not want your details recorded please contact Ms Lisa Ingerson, Project Coordinator, on 1800 068 419 *(freecall)*. A decision on whether or not you wish to be involved in the Registry does not affect your treatment in any way. If you have any questions, concerns or require further information on the National Joint Replacement Registry please do not hesitate to contact Ms. Lisa Ingerson.

Appendix 4

ICD-10-AM AND CMBS CODES

The Registry identified the following ICD-10-AM and CMBS codes for data collection.

ICD-10-AM CODES

HIP PROCEDURES

Primary Total Hip replacement

Partial Hip	49315-00	partial arthroplasty (excludes Austin Moore)
	47522-00	austin moore
Single	49318-00	total arthroplasty of hip unilateral
Bilateral	49319-00	total arthroplasty of hip bilateral

Revision Hip

49312-00	excision arthroplasty of hip (removal of prosthesis without replacement)
49324-00	revision of total arthroplasty of hip
49327-00	revision of total arthroplasty with bone graft to acetabulum
49330-00	revision of total arthroplasty with bone graft to femur
49333-00	revision of total arthroplasty with bone graft to acetabulum and femur
49339-00	revision of total arthroplasty of hip with anatomic specific allograft to acetabulum
49342-00	revision of total arthroplasty of hip with anatomic specific allograft to femur
49345-00	revision of total arthroplasty with anatomic specific allograft to acetabulum and femur
49346-00	revision of partial arthroplasty hip replacement

KNEE PROCEDURES

Patellofemoral joint of knee

49534-00	total replacement arthroplasty of patellofemoral joint of knee

Unicompartmental knee

49517-00	hemi arthroplasty of knee

Total knee

Single	49518-00	total arthroplasty of knee uinlateral
Bilateral	49519-00	total arthroplasty of knee bilateral
	49521-00	total arthroplasty of knee with bone graft to femur unilateral
	49521-01	total arthroplasty of knee with bone graft to femur bilateral
	49521-02	total arthroplasty of knee with bone graft to tibia unilateral
	49521-03	total arthroplasty of knee with bone graft to tibia bilateral
	49524-00	total arthroplasty of knee with bone graft to femur and tibia unilateral
	49524-01	total arthroplasty of knee with bone graft to femur and tibia bilateral

Revision knee

49512-00	arthrodesis with removal of prosthesis
49515-00	removal-prostheses from knee
49527-00	revision of total arthroplasty of knee
49530-00	revision of total arthroplasty of knee with bone graft to femur
49530-01	revision of total arthroplasty of knee with bone graft to tibia
49533-00	revision of total arthroplasty of knee with bone graft to femur and tibia
49554-00	revision of total arthroplasty of knee with anatomic specific allograft

Appendix 4 cont.

CMBS CODES

HIP PROCEDURES

Partial hip

49315 HIP, arthroplasty of, unipolar or bipolar

Primary hip

49309 HIP, arthrectomy or excision arthroplasty of, including removal of prosthesis (austin moore or similar (non-cement))
49318 HIP, total replacement arthroplasty of, including minor bone grafting
49319 HIP, total replacement arthroplasty of, including major bone grafting, if performed-bilateral
49321 HIP, total replacement arthroplasty of, including major bone grafting, including obtaining of graft

Revision hip

49312 HIP, arthrectomy or excision arthroplasty of, including removal of prosthesis cemented, porous coated of similar)
49324 HIP, total replacement arthroplasty of, revision procedure including removal of prosthesis
49327 HIP, total replacement arthroplasty of, revision procedure requiring bone grafting to acetabulum, including obtaining of graft
49330 HIP, total replacement arthroplasty of, revision procedure requiring bone grafting to femur, including obtaining of graft
49333 HIP, total replacement arthroplasty of, revision procedure requiring bone grafting to both acetabulum and femur, including obtaining of graft
49336 HIP, revision of a fracture of the femur where revision total hip replacement is required as part of the treatment of the fracture
49339 HIP, revision total hip replacement of, requiring anatomic specific allograft of proximal femur greater than 5cm in length
49342 HIP, revision total hip replacement of, requiring anatomic specific allograft of acetabulum
49345 HIP, revision total hip replacement of, requiring anatomic specific allograft of both femur and acetabulum
49346 HIP, revision arthroplasty with replacement of acetabular liner or ceramic head, not requiring removal of femoral component or acetabular shell

Appendix 4 cont.

CMBS CODES

KNEE PROCEDURES

Patellofemoral joint of knee

49534 KNEE, patellofemoral joint of, total replacement arthroplasty as a primary procedure

Unicompartmental knee

49517 KNEE, hemiarthroplasty of

Primary knee

49518 KNEE, total replacement arthroplasty of,
49519 KNEE, total replacement arthroplasty of, including associated minor grafting, if performed-bilateral
49521 KNEE, total replacement arthroplasty of, requiring major bone grafting to femur or tibia, including obtaining of graft
49524 KNEE, total replacement arthroplasty of, requiring major bone grafting to femur and tibia, including obtaining of graft

Revision knee

49512 KNEE, arthrodesis of, with removal of prosthesis
49515 KNEE, removal of prosthesis, cemented or uncemented, including associated cement, as the first stage of a 2 stage procedure
49527 KNEE, total replacement arthroplasty of, revision procedure, including removal of prosthesis
49530 KNEE, total replacement arthroplasty of, revision procedure, requiring bone grafting to femur or tibia, including obtaining of graft and including removal of prosthesis
49533 KNEE, total replacement arthroplasty of, revision procedure, requiring bone grafting to femur and tibia, including obtaining of graft and including removal of prosthesis
49554 KNEE, revision of total replacement of, by anatomic specific allograft of tibia or femur