AUSTRALIAN ORTHOPAEDIC ASSOCIATION

NATIONAL JOINT REPLACEMENT REGISTRY

Annual Report

2004

AUSTRALIAN ORTHOPAEDIC ASSOCIATION NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT

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NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT
2004

Hip and Knee Replacement from
September 1999 to December 2003

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PARTICIPATING HOSPITALS & COORDINATORS - September 2004

SOUTH AUSTRALIA

Public Hospitals

Clare District Hospital
Janeece Madigan, CN Theatre
Flinders Medical Centre
Jo Drabsch, CN Theatre
Gawler Health Services
Sharon Soones, RN 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
Northern Yorke Peninsula Hospital
Kerry Schultz, CN Theatre
Port Augusta Hospital
Minnie Reynolds, NUM Theatre
Port Lincoln Hospital
Marion Bassham, 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

Abergeldie Hospital
Yvette Rogers, CNC Theatre
Ashford Community Hospital
Paul Mitchell, CN Theatre
Blackwood Hospital
Dani McKenna, Clinical Manager Theatre

SOUTH AUSTRALIA continued

Private Hospitals

Burnside War Memorial Hospital
Meriel Wilson, Manager Medical Records
Calvary Hospital Adelaide Inc
Adele Alves, CN Orthopaedic Theatre
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
Dianne Brice, CN 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
Gaye Fischer, NUM 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
Neelika Dayananda, Consultant
Royal Darwin Hospital
Vivian Dunlop, NUM Theatre

Private Hospitals

Darwin Private Hospital
Deanna Knowles, 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

Fremantle Kayleeya Hospital
Kay Golding, CN Orthopaedic Theatre
Galliers Private Hospital
Verina Dell, CN Theatre
Hollywood Private Hospital
Judith Corbett, RN Theatre
Joondalup Health Campus
Denise McMahon, Deputy Health Information Manager
Mercy Hospital Mt Lawley
Veronica Hill, RN Theatre
Mount Hospital
Jackie McDonald, Orthopaedic Coordinator
Peel Health Campus
Jan Birmingham, RN Orthopaedic Theatre
Rockingham Family Hospital
Glenda Laycock, RN 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, RN Theatre
St John of God Health Care, Murdoch
Paul Maloney, Orthopaedic Technician Theatre
St John of God, Subiaco
Derek Williams, Orthopaedic Technician Theatre

TASMANIA

Public Hospitals

Launceston General Hospital
Paul Van nynanten, CN Orthopaedic Theatre
North West Regional Hospital
Bill Kerr, CN Orthopaedic Theatre
Royal Hobart Hospital
Colleen Neal, RN Theatre

Private Hospitals

Calvary Hospital
Jane Walker, CNS Orthopaedic Theatre

TASMANIA

Private Hospitals

Hobart Private Hospital
Sarah Bird, Perioperative Services Manager
Mersey Community Hospital
Grace Kamphuis, NUM Theatre
North-West Private Hospital
Linda Wynwood, Theatre Manager
Calvary Health Care St Luke's Campus
Carolyn Madigan, Kerri Foster
Patient Information Services
Alice McDonald, CNC Theatre
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
Tina Muller, CNC Orthopaedic Ward
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
Lorraine McLoughlin, Research Assistant
Princess Alexandra Hospital
Audrey Hamilton, RN Theatre
Queen Elizabeth II Jubilee Hospital
Marilyn Kondai, EN Theatre
Redcliffe Hospital
Christina Barry, Health Information Manager
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
Jessica Morris, CN Theatre
Caboolture Hospital
Sue Adams, NUM Theatre
Karen Crawford, CNC Theatre
Cairns Private Hospital
Karen Muir, 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 Private Hospital
Lyn Martin, NUM Theatre
Holy Spirit Northside Hospital
Molly Harmer, CNC Orthopaedic Theatre
John Flynn Hospital
Di Sapwell, Manager Surgical Services
Logan Private Hospital
Cheryl Dennis, Perioperative Manager
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
Gail Simpson, RN Orthopaedic Theatre
St Andrew's Hospital, Toowoomba
Maxine Singleton, RN Theatre

QUEENSLAND continued

Private Hospitals

St Andrew's War Memorial Hospital
Nicole Nash-Arnold, Theatre Coordinator
St Stephen's Private Hospital
Julie Weber, RN Theatre
St Vincent's Hospital
Judy Plotecki, RN Perioperative Services
Sunnybank Private Hospital
Claire Haskew, RN Theatre
The Sunshine Coast Private Hospital
Nerida Domenici, RN Theatre
The Wesley Hospital
Carolyn Wilson, CNM Ward 2M
The Wesley Park Haven Private Hospital
Karryn Lytton NUM Theatre

VICTORIA

Public Hospitals

Austin & Repatriation Medical Centre, Austin Campus
Ross Kentish, ANUM Orthopaedic Theatre
Ballarat Health Services
Joy Taylor, SNM, Perioperative Services
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
Yolanda Whitehead, Associate Unit NUM Theatre
Monash Medical Centre, Moorabbin Campus
Sue Rosalie, A/CN Orthopaedic Theatre
Mountain District Hospital
Rosslyn Martin, NUM Theatre

Participating Hospitals & Coordinators - continued

VICTORIA continued

Public Hospitals

Northeast Health Service Wangaratta
Lois Foley, NUM Theatre
Peninsula Health Service, Frankston Hospital
Kathy Allars, NUM Theatre
Portland District Health
Julie Sealy, NUM Theatre
Repatriation Hospital, Heidelberg
Ian Manly, NUM Theatre
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
Eng Bryne, 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
Williamstown Hospital
Maureen Clark, ACN Theatre
Wimmera Health Care Group
Pam Muszkieta, NUM Theatre

Private Hospitals

Baronor Private Hospital
Chan Leong, NUM Theatre
Beleura Private Hospital
Jean Leyland, RN Theatre
Bellbird Private Hospital
Sue George, Orthopaedic Case Manager
Cabrini Private Hospital, Malvern
Sharni Clark, Project Officer
Epworth Hospital
Tilak Weerakkody, RN Theatre
Ronelle Kok, RN Theatre
Freemasons Hospital
Claudia Nozzolillo, CNS Orthopaedic Theatre

VICTORIA continued

Private Hospitals

Geelong Private Hospital
Andrew Zygmunt, ANUM Orthopaedic Theatre
John Fawkner Hospital
Kaye Delmore, CNS Orthopaedic Theatre
Knox Private Hospital
Sally Thomas, Orthopaedic Liaison Nurse
Latrobe Private Hospital
Joyce Zara, AUM Theatre
Linacre Private Hospital
Michelle Donegan, NUM Theatre
Maryvale Private Hospital
Janine Johnston, A/CN Orthopaedic Theatre
Masada Private Hospital
Jeanette MacLeaine, 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 Alvernia Mercy Hospital
Jenny Dillon, ACN Theatre
Mount Waverly Private Hospital
Marian Burns, NUM Theatre
Northpark Private Hospital
Gail Evans, NUM 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, 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
Lisa Heywood, RN Theatre
The Avenue Hospital
Annellen Watson, RN Theatre
The Valley Private Hospital
Jan Stone, NUM Perioperative Services
Vimy House Private Hospital
Margaret Baker, NUM Theatre

Participating Hospitals & Coordinators - continued

VICTORIA continued

Private Hospitals

Wangarratta Private Hospital
Cathy Duncan, NUM Theatre
Warringal Hospital
Judy McIvor, RN Theatre
Western Private Hospital
Vicki Canning, NUM Theatre

NEW SOUTH WALES

Public Hospitals

Albury Base Hospital
Jo Brennan, NUM Theatre
Armidale Hospital
Debbie Spokes, NUM Theatre
Auburn Health Service
George Bugueno, 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
Tracey Moore, Quality Manager
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

NEW SOUTH WALES continued

Public Hospitals

Liverpool Health Service
John Murphy, NUM Operating Theatre
Maitland Hospital
Margaret Mantle, NUM Theatre
Manly District Hospital
Karen Jones, NUM Theatre
Manning Base Hospital
Graham Cooke, RN Theatre
Mona Vale Hospital
Sue Travis, 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 Wainstein, 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
Jennifer McLean
Tamworth Base Hospital
Kevin Attart, RN Theatre
The Prince of Wales Hospital
Phyllis Davis, NUM Theatre
Tweed Heads District Hospital
Russell Smith, 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
Nerida Stevens, Clinical Coder
Calvary Hurstville Community Private Hospital
Debbie Lohman, Orthopaedic Case Manager
Cape Hawk Community Private Hospital
Julie Bate, NUM Theatre
Dalcross Private Hospital
Anne Carroll, Director of Nursing
Jan Livingstone, NUM Theatre
Delmar Private Hospital
Ingrid Statis, RN Theatre
Dubbo Private Hospital
Gail Priest, NUM Theatre
Dudley Orange Private Hospital
James Bird, RN Operating Theatre
Hawkesbury Health Service
Teresa Luczak, CNS Theatre
Holroyd Private Hospital
Crys May, NUM Theatre
Hunter Valley Private Hospital
Margaret Water, NUM Theatre
Michael Summerville, RN Theatre
Hunters Hill Private Hospital
Jenny May, CNS Orthopaedic Theatre
Illawarra Private Hospital
Jan Goldrick, Theatre
Kareena Private Hospital
Gail O'Connor, NUM Theatre
Lake Macquarie Private Hospital
Robert Reddie, Theatre
Lingard Private Hospital
Jo Bryan, NUM Theatre
Macarthur Private Hospital
Brenda Wood, Case Manager General Ward
Mayo Private Hospital
Ms Ellie Richardson, NUM Theatre
Mosman Private Hospital
Sue Long, NUM Theatre
Nepean Private Hospital
Jan Wernert, NUM Theatre
NIB Private Hospital
Jodi Kelly, RN Theatre,

NEW SOUTH WALES continued

Private Hospitals

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
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
Mary Sands, NUM Theatre
St Vincent's Private Hospital Darlinghurst
Astiness Kalach, Health Information Manager
St Vincent's Private Hospital Lismore
Loris Gordon, 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 Soutwest 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
Leona Higgins, CNS Orthopaedic Theatre
Westside Private Hospital
Ruth Wigley, NUM Theatre

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.

INTRODUCTION

This is the fifth annual report of the Australian Orthopaedic Association National Joint Replacement Registry. The Federal Government provides funding to the Australian Orthopaedic Association (AOA) for the National Joint Replacement Registry. The 1st Annual Report was released in 2000. Since then the Registry has continued to develop. All 294 Hospitals undertaking joint replacement in Australia contribute data to the Registry. At the end of August 2004 the Registry had received information on 184,013 hip and knee procedures.

BACKGROUND TO THE REGISTRY

Joint replacement surgery is a common procedure that has considerable success in alleviating pain and disability in individuals suffering a variety of major joint disorders. In Australia over 55,000 joint replacement procedures were performed in 2003. Previously, joint replacement was reserved for the elderly. However, due to the success of the procedure it is increasingly used in younger individuals. This, combined with an ageing population, has resulted in an increase in the incidence of primary joint replacement. The number of revision operations is also increasing. More patients are surviving longer than the life expectancy of the joint replacement. Revision surgery is associated with increased morbidity and mortality and has a far less successful outcome than primary joint replacement. As such it is essential to ensure that everything possible is done to limit the rate of revision surgery.

There is a concern about the increasing number and variety of prostheses now available on the Australian market. More recent prostheses are the product of new technologies and for many, the mid to long term survival rates are unknown. It is known that there is considerable variation in outcome for different prostheses. Surgical technique and specific patient characteristics also affect longevity. Inadequate outcome data, as well as variability related to different surgical techniques and diagnostic groups, have made it difficult for surgeons to identify the relative effectiveness of different prostheses.

The AOA National Joint Replacement Registry simultaneously monitors all types of prosthetic design. A registry is the most effective method of determining which prostheses and surgical techniques are most successful for given demographic and diagnostic sub-groups within the community. A number of registries have been established in other countries. The ability to identify factors important in achieving successful outcomes has resulted in both improved standards and significant cost savings in those countries.

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 OVERVIEW

Implementation of the Registry began in September 1999. A specific Registry Committee appointed by the Federal Board of the AOA manages the Registry. The committee consists of the Chairman, Registry Director, an orthopaedic surgeon from each state and territory and two orthopaedic industry representatives (see back of cover for committee members). The Director of the Registry is responsible for the overall management. The Coordinator is employed by the AOA and is involved in maintaining cooperation of hospitals, surgeons and government, and in implementing new strategies and in 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.

Registry Implementation

Hospitals nationally, both public and private, that undertake hip or knee replacement were contacted to participate in data collection for the Registry. Following approval from each hospital, procedures were implemented to begin data collection. Each hospital nominated a hospital coordinator (usually a member of theatre nursing staff) to liaise with Registry staff.

Implementation of the Registry commenced in South Australia in September 1999. Since that time all hospitals (294) in Australia that undertake joint replacement have agreed to submit data. Currently the Registry receives information on over 5000 procedures per month.

Data Collection Method

Hospitals participating in the Registry 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 with continued development of systems to collect data electronically as soon as this is feasible.

Data for 2004 Report

This Report has been prepared using data collected during the period September 1999 to December 2003. This includes data from all states and territories. As the staged implementation of the Registry was completed in 2002 then 2003 is the first year that the Registry has national data for a complete year.

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 4,816 (9.1%) 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 a gold 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 joint prostheses 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. At this point in time only a few 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.

A Note on 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.

What is New in 2004

This year has been an exciting one for the Registry as we have built on previous developments and expanded the information provided in this report. The formatting of the Report is similar to last year. The Registry has continued with the approach developed last year to the way survivorship is reported, for both prostheses (time to revision) and patients (time to death) being expressed in terms of observed "component-years" and "person-years" respectively.

A new section has been added to the Report this year that details acute care expenditure related to joint replacement surgery.

The Report contains an increasing number of analyses comparing performance of different classes of prostheses. 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.

The Registry identifies an increasing number of specific prostheses that have been identified as having a higher than anticipated revision rate. Where possible we have included comments from relevant companies on the results. Unfortunately it has not been possible to do this for all of these prostheses.

GOVERNMENT JOINT REPLACEMENT DATA 1994 - 1995 to 2002 - 2003

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 an eight-year period. These data do not provide any prosthesis or outcome information.

Hip and knee joint replacement surgery continues to increase. The total number of hip and knee replacement procedures for the twelve-month period from the 1st July 2002 to the 30th June 2003 was 55,836 (Table G1). This was an increase of 5.8% from the previous year (Table G2). The yearly changes for each of the states and territories are presented in Table G3 and Figure G1.

Data for the last eight-year period demonstrates that hip and knee joint replacement surgery has increased by 74.5%. This is equivalent to an average annual increase of 7.2%. Hip replacement procedures increased by 49.9% and knee replacement by 109.4% (Table G4). Table G5 details the growth of each type of hip and knee replacement per state and territory during this time. Queensland had the largest increase in hip replacement procedures (63.5%). Western Australia had the largest increase for knee replacement (115.9%).

Data Collection Method

The Registry obtained data on the number and type of joint replacement procedures, for specific ICD-10-AM codes (Appendix 4), undertaken in public and private hospitals from each state and territory health department. Data were obtained from the 1st July 1994 to 30th June 2003. 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. The Government data have not been age or sex adjusted.

Incidence

The incidence per 100,000 for each type of hip and knee procedure, e.g. primary or revision, for each state is reported in Table G6.

The incidence per 100,000 for hip and knee replacement was 280.8 for the 2002-2003 year. This is an increase from 206.8 in 1997-1998 (Table G6).

This is the first year that knee replacement (140.8 per 100,000) has had a greater incidence than hip replacement (140.0 per 100,000) (Table G6).

The incidence for all types of hip and knee replacement procedures differs between the states and territories. The incidence per 100,000 for hip replacement is highest in Tasmania (201.0) and South Australia (168.3) and lowest in Australian Capital Territory/Northern Territory (108.6) and Queensland (111.3). The incidence per 100,000 for knee replacement is highest in South Australia (171.9) and New South Wales (159.7) and lowest in Victoria (118.9) (Table G4).

Hip Replacement

The total number of hip replacements performed for the financial year 2002-2003 was 27,833. Of this 20.3% were partial replacements, 66.6% were primary total replacements and 13.1% were revision replacements (Tables G1). Compared to the previous financial year hip replacement increased by 4.3%. The greatest increase was for primary hips (6.7%) (Table G2). There are some differences between the states and territories in the percentages of type of hip procedures undertaken. Partial hip replacement varied from 15.8% in Tasmania to 23.4% in Queensland.

Primary hip replacement ranged from 62.6% in Queensland to 70.7% in Tasmania (Table G1).

The percentage of hip replacement procedures that were revision decreased slightly to 13.1% (n=3,639) (13.9% previous year) (Figure G6). 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. The Territories (ACT/NT) had the highest proportion of revision hips (16.6%) and South Australia the lowest (11.8%).

Knee Replacement.

The total number of knee replacements was 28,003 outnumbering hip replacement (27,833) for the first time. These figures include all types of replacements for all diagnoses. Of the knees 1.1% were patella/trochlear replacements, 12.7% were unicompartmental, 76.9% were primary total and 9.3% were revision procedures (Table G1). Knee replacement increased by 7.3% when compared to 2001-2002. Unicompartmental knee replacements are still increasing (9.6%) as are the number of revision knee procedures (13.1%) (Table G2).

The percentage of knee replacements that were revision procedures in 2003-2003 was 9.3% (Table G1). As is the situation for hip it is not possible to determine from these data what type of revision has been performed. There remain variations in the proportion of revision procedures between the states and territories (Figure G5).

Private and Public

As in previous years there has been a greater increase in joint replacement in the private sector. Hip and knee replacement increased by 6.6% in the private sector and 4.5% in the public sector. Hip replacement alone increased by 5.1% in the private sector compared to 3.3% in the public sector. Knee replacement has increased more than hip replacement in both the private and public sectors. The number of knee replacements increased by 7.8% in the private sector and 6.3% in the public sector (Tables G8, G9 and G10, Figures G6, G7 and G8). For the first time the annual changes between the states and territories in the public and private sectors from 1997-98 to 2002-2003 are detailed (Figures G9, G10, G11, G12, G13, G14, and G15).

Hip and Knee Replacement

Table G1: Number *(percent)* of Hip & Knee Replacements Nationally 1/7/2002 - 30/6/2003

Type of joint replacement	*NSW*	*VIC*	*QLD*	*WA*	*SA*	*TAS*	*ACT/NT*	*Aust. total*
Hip replacement								
Partial	1,837	1,490	987	524	563	152	107	5,660
	20.2	*19.4*	*23.4*	*19.1*	*21.9*	*15.8*	*18.9*	*20.3*
Primary total	6,051	5,208	2,644	1,884	1,704	678	365	18,534
	66.6	*67.8*	*62.6*	*68.6*	*66.3*	*70.7*	*64.5*	*66.6*
Revision	1,195	986	594	338	303	129	94	3,639
	13.2	*12.8*	*14.1*	*12.3*	*11.8*	*13.5*	*16.6*	*13.1*
Total	**9,083**	**7,684**	**4,225**	**2,746**	**2,570**	**959**	**566**	**27,833**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Knee replacement								
Patellar/trochlear	170	38	44	17	29	0	5	303
	1.6	*0.6*	*0.9*	*0.6*	*1.1*	*0.0*	*0.8*	*1.1*
Unicompartmental	1,740	675	333	229	483	27	69	3,556
	16.3	*11.5*	*6.9*	*8.4*	*18.4*	*4.2*	*10.7*	*12.7*
Primary total	7,728	4,560	4,028	2,273	1,848	574	529	21,540
	72.4	*78.0*	*83.6*	*83.0*	*70.4*	*88.9*	*82.0*	*76.9*
Revision	1,042	576	413	221	265	45	42	2,604
	9.8	*9.8*	*8.6*	*8.1*	*10.1*	*7.0*	*6.5*	*9.3*
Total	**10,680**	**5,849**	**4,818**	**2,740**	**2,625**	**646**	**645**	**28,003**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
State Hip/KneeTotal	**19,763**	**13,533**	**9,043**	**5,486**	**5,195**	**1,605**	**1,211**	**55,836**

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

Table G2: Hip and Knee Joint Replacement Percentage Changes 1/7/2002 - 30/6/2003 Relative to 1/7/2001 - 30/6/2002

Type of joint replacement	**Aust. Total 1/7/'00-30/6/'01**	**Aust. Total 1/7/'01-30/6/'02**	**Aust. Total 1/7/'02-30/6/'03**	**Percentage change relative to 2001-2002**
Hip replacement				
Partial	5,465	5,601	5,660	1.1
Primary total	15,377	17,378	18,534	6.7
Revision	3,443	3,710	3,639	-1.9
Total	**24,285**	**26,689**	**27,833**	**4.3**
Knee replacement				
Patellar/trochlear	212	246	303	23.2
Unicompartmental	2,802	3,244	3,556	9.6
Primary total	17,119	20,296	21,540	6.1
Revision	2,119	2,303	2,604	13.1
Total	**22,252**	**26,089**	**28,003**	**7.3**
National Total	**46,537**	**52,778**	**55,836**	**5.8**

Table G3: State and Territories Number and Percentage Changes for combined Hip and Knee Replacement 1/7/2002 - 30/6/2003 Relative to 1/7/2001 - 30/6/2002

States and Territories	State Total 1/7/'00-30/6/'01	State Total 1/7/'01-30/6/'02	State Total 1/7/'02-30/6/'03	Percentage change relative to 2001 – 2002
NSW	16,179	18,362	19,763	7.6
VIC	11,121	12,528	13,533	8.0
QLD	7,518	8,971	9,043	0.8
WA	4,565	4,912	5,486	11.7
SA	4,818	5,330	5,195	-2.5
TAS	1,349	1,450	1,605	10.7
ACT/NT	987	1,225	1,211	-1.1
National Total	**46,537**	**52,778**	**55,836**	**5.8**

Figure G1: State & Territories Total Joint Replacements 1/7/2001 - 30/6/2002 & 1/7/2002 - 30/6/2003

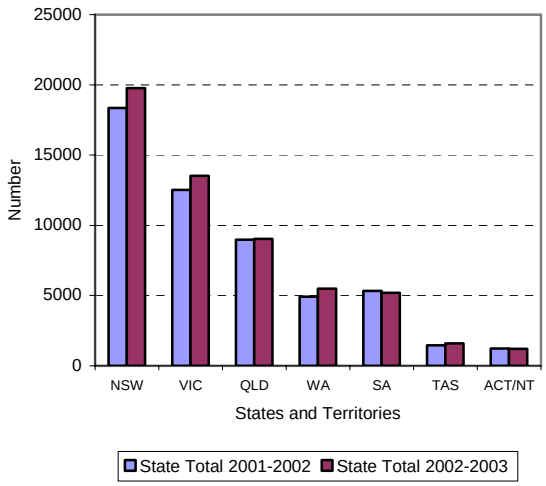

Table G4: Number of Hip and Knee replacement procedures from 1994 - 1995 to 2002 - 2003 with percentage change on previous year.

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
***1994/95-2002/03**		**49.4**		**109.4**		**74.5**

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 2001 - 2003

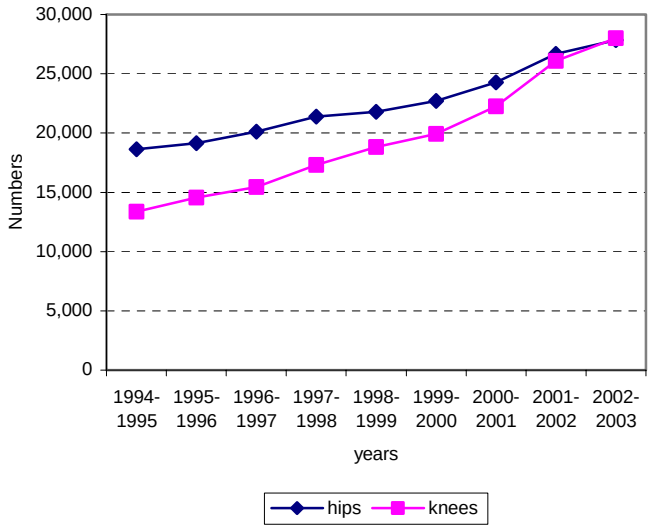

Table G5: Percentage change between 1994 - 1995 to 2002 - 2003 for both hip and knee replacement procedures, by state

Type of joint replacement	*NSW* %	*VIC* %	*QLD* %	*WA* %	*SA* %	*TAS* %	*ACT/NT* %	*Aust total* %
Hip replacement								
Partial	27.7	16.3	54.2	24.5	8.9	32.2	81.4	26.6
Primary total	56.0	66.3	70.6	84.5	45.1	59.9	50.2	62.3
Revision	32.5	33.2	50.8	30.0	-7.1	79.2	91.8	32.7
Total hips	**46.1**	**49.1**	**63.5**	**61.3**	**27.4**	**57.0**	**61.3**	**49.4**
Knee replacement								
Patellar/trochlear	#	#	#	#	#	#	#	#
Unicompartmental	#	#	#	#	#	#	#	#
Primary total	68.3	79.7	86.1	100.8	60.7	93.9	234.8	79.1
Revision	106.3	110.2	76.5	61.3	96.3	200.0	2.4	94.2
Total (all types) knees	**109.5**	**108.0**	**100.9**	**115.9**	**104.3**	**107.7**	**224.1**	**109.4**
Total Hip & Knee	**74.7**	**69.9**	**81.5**	**84.7**	**57.3**	**74.1**	**120.2**	**74.5**

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*

Incidence of Hip and Knee Replacement for 2002 - 2003

Table G6: Incidence of Hip and Knee Joint Replacement by State & Territory per 100,000 population for 2002 - 2003

Type of joint replacement	*NSW* **Pop.** *6686600*	*VIC* **Pop.** *4917400*	*QLD* **Pop.** *3796800*	*WA* **Pop.** *1952300*	*SA* **Pop.** *1527400*	*TAS* **Pop.** *477100*	*ACT/NT* **Pop.** *521300*	*AUST.* *Pop.* *19881500*
Hip replacement								
Partial	27.5	30.3	26.0	26.8	36.9	31.9	20.5	**28.5**
Primary total	90.5	105.9	69.6	96.5	111.6	142.1	70.0	**93.2**
Revision	17.9	20.1	15.6	17.3	19.8	27.0	18.0	**18.3**
Total	**135.8**	**156.3**	**111.3**	**140.7**	**168.3**	**201.0**	**108.6**	**140.0**
Knee replacement								
Patellar/trochlear	2.5	0.8	1.2	0.9	1.9	0.0	1.0	**1.5**
Unicompartmental	26.0	13.7	8.8	11.7	31.6	5.7	13.2	**17.9**
Primary total	115.6	92.7	106.1	116.4	121.0	120.3	101.5	**108.3**
Revision	15.6	11.7	10.9	11.3	17.3	9.4	8.1	**13.1**
Total	**159.7**	**118.9**	**126.9**	**140.3**	**171.9**	**135.4**	**123.7**	**140.8**
State total	**295.6**	**275.2**	**238.2**	**281.0**	**340.1**	**336.4**	**235.0**	**280.8**

Note: *The Total Australian population includes Cocos Island, 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.
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www.abs.gov.au/Ausstats/abs@.nsf/Lookup/FF22D13F7075391CCA256E5A00755263…9/09/2004

Figure G3: Incidence of Joint Replacement by State & Territories 2002 - 2003

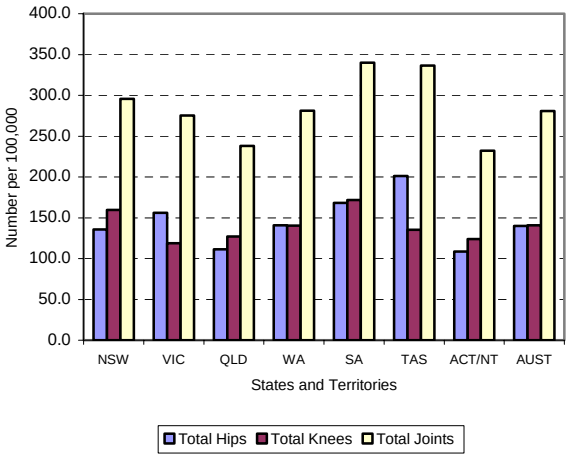

Table G7: Incidence of Different Hip and Knee Joint Replacement Procedures per 100,000 population for Australia for 1999 - 2000 to 2002 - 2003

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

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 Table 1 – POPULATION CHANGE, Summary (a)
www.abs.gov.au/Ausstats/abs@.nsf/Lookup/FF22D13F7075391CCA256E5A00755263…9/09/2004

Figure G4: Percentage of Revision Hip Replacement 2002 - 2003

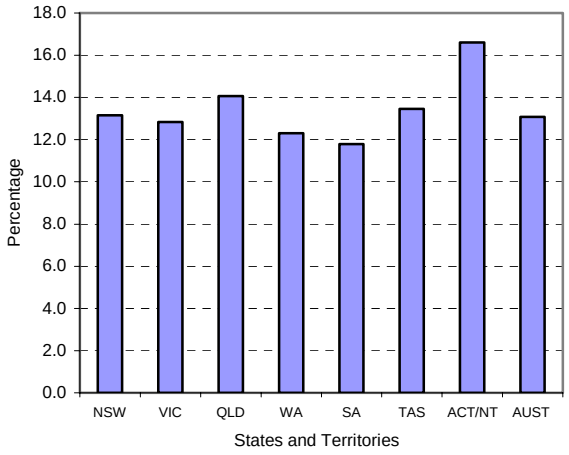


Figure G4 represents, within each state, the percentage of hip surgery that was revision surgery for 2002 - 2003. It is not possible to determine which type (partial, primary or revision) of hip replacement had been revised.

Figure G5: Percentage of Revision Knee Replacement 2002 - 2003

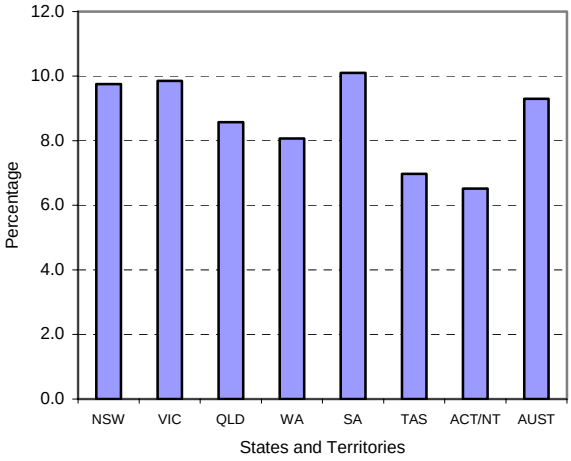


Figure G5 represents, within each state, the percentage of knee surgery that was revision surgery for 2002 - 2003. Primary total or uni as well as revision knee replacements may have been revised.

Public and Private 1997 - 1998 to 2002 - 2003

Table G8: Public & Private Percentage Changes relative to previous year per year for Hip and knee replacement for the last 6 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%)***

Figure G6: Number of Hip and Knee Joint Replacements at Public & Private Hospitals 1/7/2002 - 30/6/2003

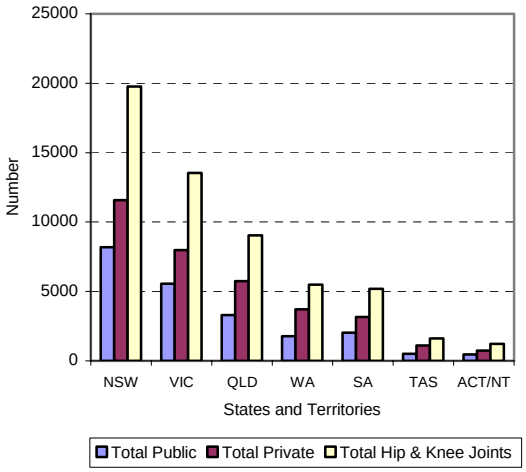


Table G9: Public & Private Percentage Changes for Hip replacement per year for the last 6 years 1st July – 30th June

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%)***

Figure G7: Number of Hip Joint Replacements at Public & Private Hospitals 1997 - 1998 to 2002 - 2003

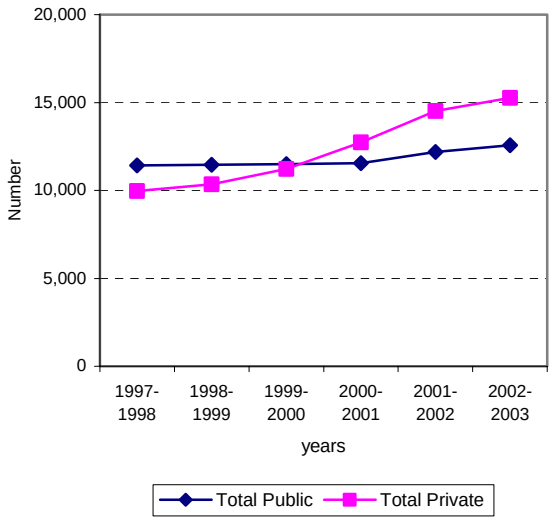


Table G10: Public & Private Percentage Changes for Knee replacement per year for the last 6 years 1st July - 30th June

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%)***

Figure G8: Number of Knee Joint Replacement at Public & Private Hospitals 1997 - 1998 to 2002 - 2003

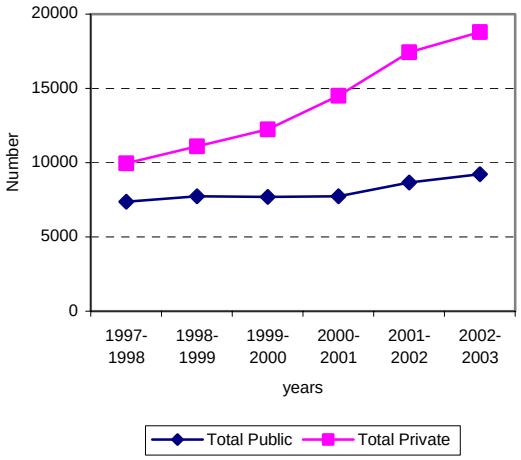


Figure G9: New South Wales - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03

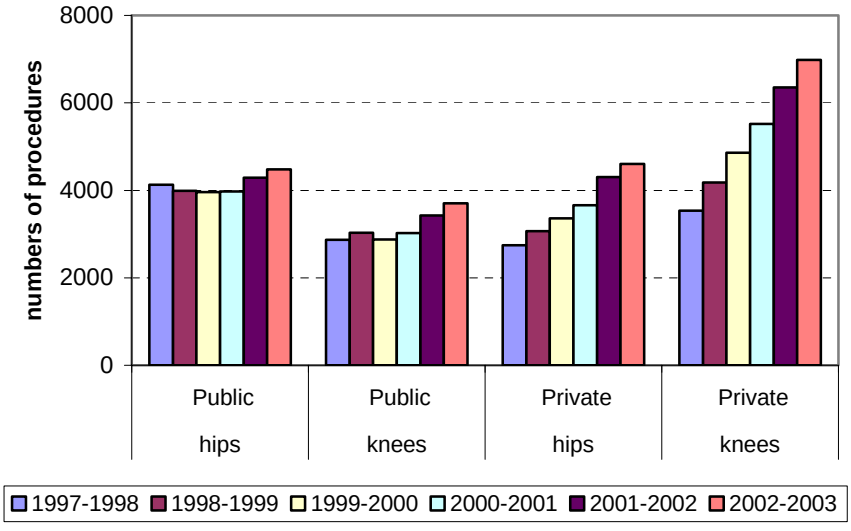


Figure G10: Victoria - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03

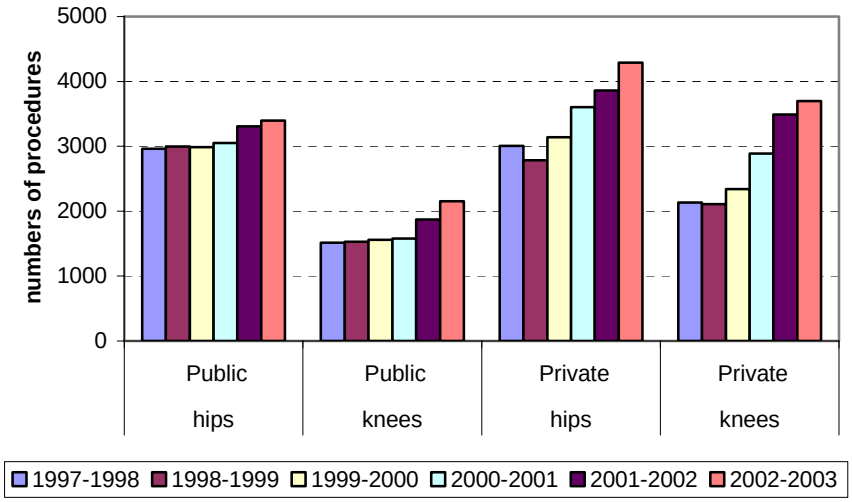


Figure G11: Queensland - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03

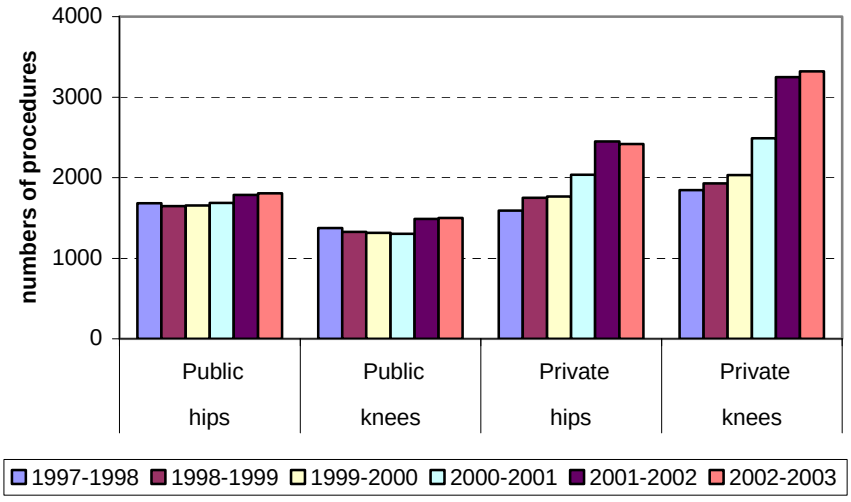


Figure G12: Western Australia - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03

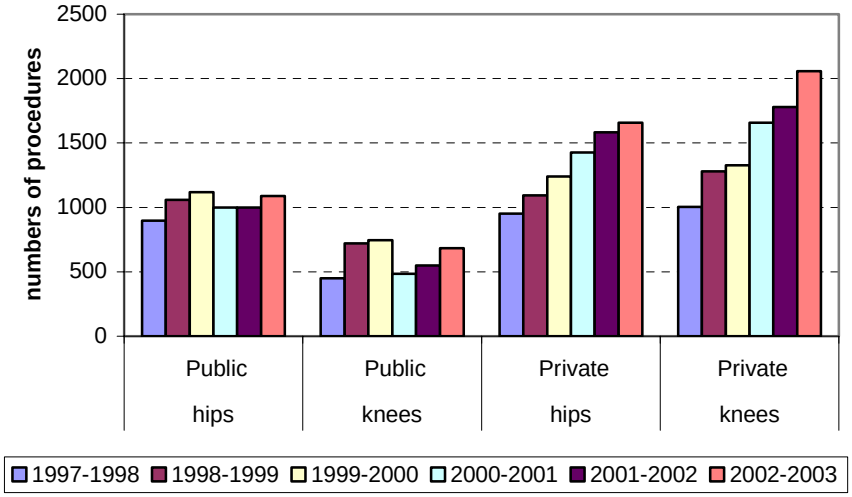


Figure G13: South Australia - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03

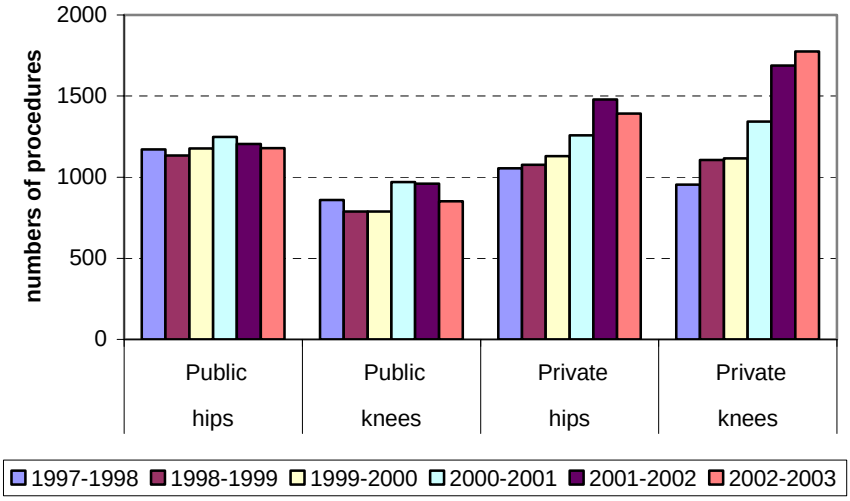


Figure G14: Tasmania - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03

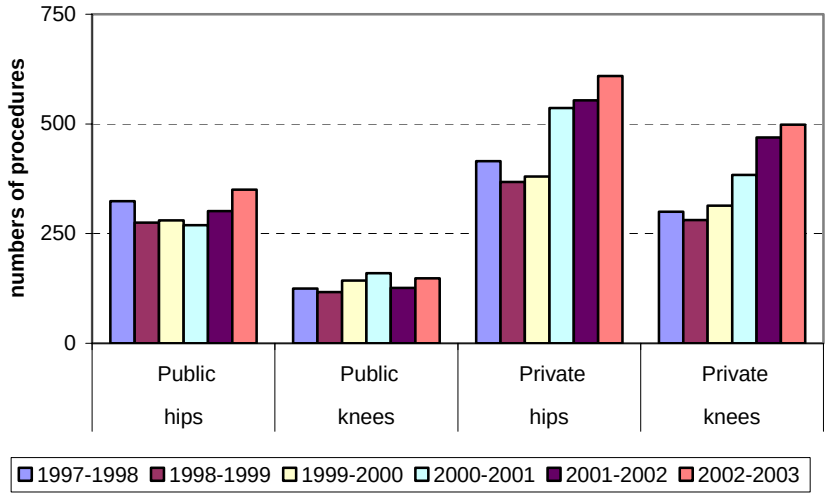
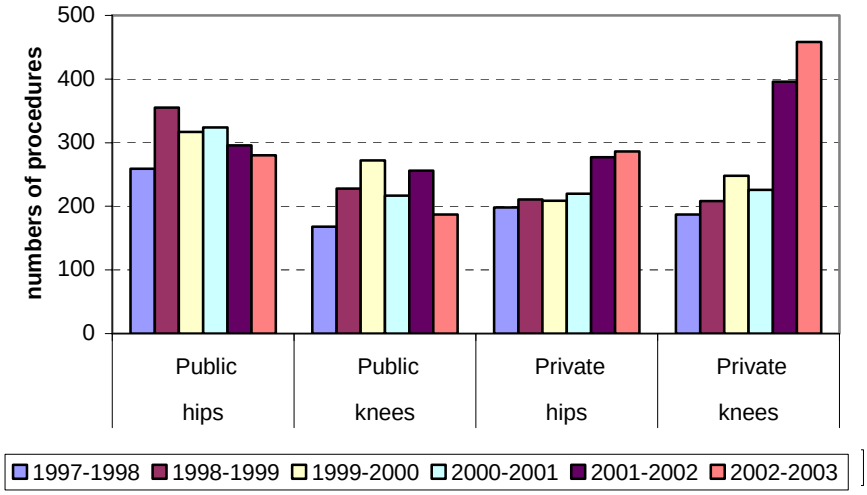


Figure G15: Australian Capital Territory/Northern Territory - Number of Hip and Knee procedures in Public and Private Hospitals 1997 - 98 to 2002 - 03



ACUTE CARE EXPENDITURE

Introduction

In collaboration with John Moss, Senior Lecturer, Dept of Public Health, The University of Adelaide, the Registry investigated expenditure on hip and knee replacement. The specific aim of this study was to estimate total acute care and prostheses specific hip and knee replacement expenditure in Australia by third party payers, (i.e. government and private health insurers). Both public and private sector expenditure for the three financial years between 1999 and 2002 have been estimated.

Method

To identify the changes in the numbers of procedures over time each state and territory health department provided the number of procedures for specified hip and knee ICD-AM-10 codes for each year from 1994-1995 to 2002-2003. These data were aggregated to provide national totals for each financial year. Data from the National Hospital Cost Data Collection (NHCDC), and the state and territory health departments have been used to estimate the third party expenditure on hip and knee replacement for the three financial years from 1999 for the public and private sectors. To adjust for inflation, all expenditures were expressed in constant 2001-02 dollars using the Consumer Price Index. NHCDC is a sampling exercise that estimates detailed population and cost activity data. The NHCDC calculations do not include private sector fees for surgeons, assistants, anaesthetists, imaging or pathology. 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 work-up or the cost of rehabilitation. Patient co-payments are not included.

Results

- Over the last eight years, the annual number joint replacements has increased by 74.5%, (hips 49.9%, knees 109.4%), being equivalent to an average annual increase of 7.2% (Figure E1)
- The greatest yearly rate of increase occurred in 2001-2002 (total 13.4%, hips 9.9%, knees 17.3%)
- During that year, the rate of increase was greater in the private than the public sector (hips private 13.9%, public 5.5%; knees private 20.1%, public 12.0%)
- In 2001-2002 expenditure on acute care for hip and knee increased by 24% to $815.5 million (constant 2001-02 Australian dollars) (hips 18.2%, knees 30.7%) (Figure E3)
- This equates to increased expenditure of $158 million compared to the previous year
- Prostheses expenditure increased by 37.1% during 2001-2002 (hips 27.3%, knees 46.8%)
- This rate of increase was greater in the private than the public sector (hips private 38.0%, public 9.6%; knees private 62.7%, public 11.3%)
- The total prostheses expenditure for the 2001-2002 year was $273.2 million (hips private $85.5 million, public $41.0 million, knees private $112.3 million, public $34.4 million)
- This equates to increased expenditure for prostheses of $74 million compared to the previous year (hips private $23.6 million, public $3.6 million; knees private $43.3 million, public $3.5 million)

Discussion

During the financial year 2001-2002 there was a large increase in the number of joint replacements undertaken. This was on top of a background of consistently high increases over at least the last eight years. The increase occurred principally in the private sector and was greater in knee replacements. The time trend may be partly explained by the Commonwealth

Government having encouraged more people to take up private health insurance, 44.2% in 2002 compared to 30.6% in 1999. The overall expenditure for acute care increased considerably more than would be anticipated when compared to the increase in the number of joint replacements undertaken (24.0% vs. 13.4%). The greatest component of this increased expenditure was related to the amount spent on prostheses. This increased by 37.1% overall (hips 27.3%, knees 46.8%).

Conclusion

The incidence of hip and knee replacement surgery has increased considerably over recent years and is anticipated to continue to do so. Currently, expenditures are increasing at a greater rate than the increase in the number of procedures. This is most evident with knee replacement. These trends will have major implications for Australia's future health care budget.

Table E1: Data resources

Hospital Type	Data	Data Source
Public Hospitals	• Numbers of hip & knee replacements • Acute care costs for inpatients, public hospitals based on DRG's	• State & territory health depts. • National Hospitals Costs Data Collection, rounds 4, 5 & 6 Commonwealth Department of Health& Ageing
Private Hospitals	• Numbers of hip & knee replacements • Acute care costs for inpatients, private hospitals (thus excluding surgeon, assistants and anaesthetist fees, and investigations) • Surgeon, assistant, anaesthetist fees • Investigations -x rays -bloods	• State & territory health depts. • National Hospitals Costs Data Collection, rounds 4, 5 & 6 Commonwealth Department of Health& Ageing • Medical Benefits Schedule • Survey of radiological companies • Survey of clinical laboratories

Figure E1: Numbers and percentage increases over eight years

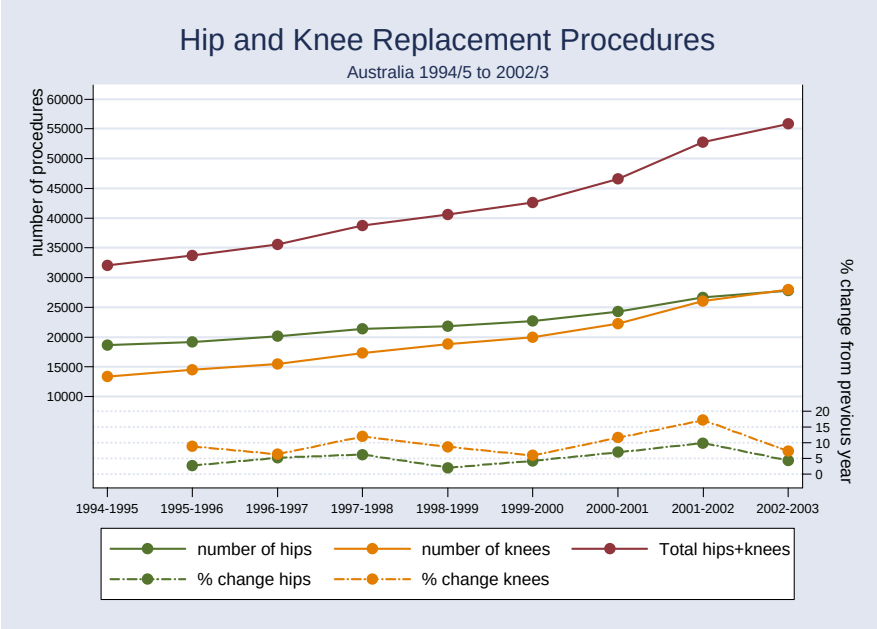


Figure E2: Numbers of procedures public and private hospitals

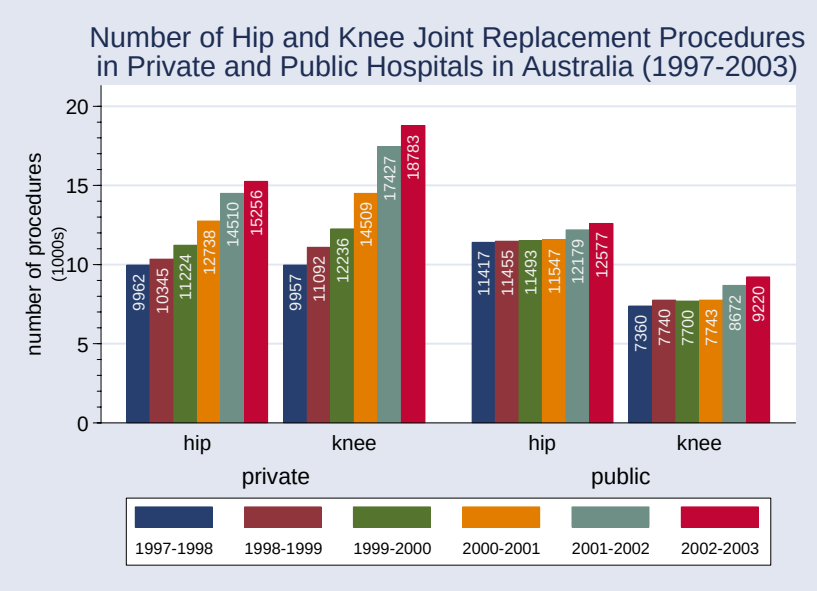
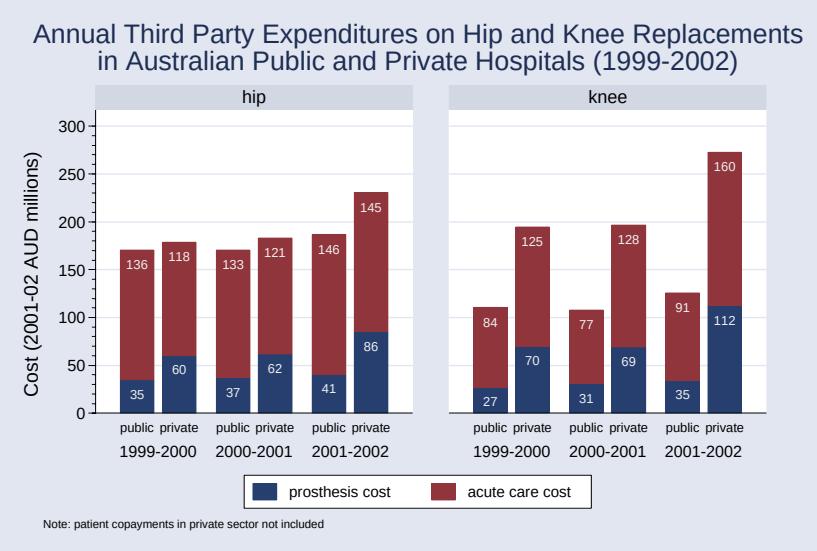


Figure E3: Expenditure on hip and knee replacements



AOA National Joint Replacement Registry
Hip Replacement Data

The data presented in this report are for the period 1/09/1999-31/12/2003 and involved the analysis of just over 74,000 hip procedures. This is an additional 26,915 procedures compared to last year's annual report.

Demographics

There is no change in the proportion of different hip procedures recorded by the Registry (primary partial, primary total and revisions) compared to last year (Table H1). Gender and age distributions also remain similar (Tables H2-H5). The only difference this year is that gender and age have been detailed separately for resurfacing procedures for the first time. Compared to conventional primary hip replacement resurfacing has been undertaken on a much younger population (resurfacing mean age = 53.1 compared to conventional primary mean age = 68.1) and unlike conventional primary hips the majority of patients are male (resurfacing 69.3% male v conventional primary 45.2% male) (Table H4). The principal diagnosis for the different procedures has also not changed (Table H6-H8). Resurfacing procedures are undertaken for osteoarthritis a little more commonly than conventional primary hips (92.3% resurfacing, 88.1% conventional).

Prosthesis Usage and Fixation for Primary Partial Hip Replacement

The Registry regards unipolar monoblock, unipolar modular, and bipolar prostheses when used in the primary situation as primary partial hip replacements. There are now 12,601 of these procedures recorded. When considered as a group 54.2% are used without cement. This is a slight reduction on the percentage reported last year (Table H9).

The unipolar monoblock prostheses (Austin-Moore and Thompson Type prostheses) account for 60.9% of all primary partial hip replacements now recorded. This is a change compared to that reported last year when 64% of primary partial hip replacements were monoblock prostheses. This reduction has occurred due to a decrease in the proportional use of these prostheses. Only 55.4% of new primary partials reported during 2003 were unipolar monoblock prostheses. The relative use of the Austin-Moore and the Thompson however has not changed since last year. There has also been no change in the method of fixation of these prostheses apart from a slight increase in the use of the Thompson in a cementless manner. The number of cementless Thompsons however remains small (Table H10).

Unipolar modular prostheses have increased as a proportion of primary partial hip replacements from 9.5% last year to 12.1% this year. Of the additional partials reported in 2003 unipolar modular prosthesis were 16.7% of the total. Cemented stems are used most often (83.2%) with the Exeter stem being the most common. The Alloclassic SL is the most common cementless stem and is used just over 50% of the time when a cementless stem is used. The number of cemented stems recorded using a modular unipolar head has increased from 16 to 20 during 2003. Cementless stems have increased from 9 to 16. The Unitrax is the most used unipolar head (Table H11).

The proportion of bipolar prostheses has only marginally increased since last year from 26.4% to 27.0% of all partial primary hips. As with the unipolar modular prostheses, cemented stems are used more frequently (86.9%) and the Exeter stem is the most common, being used in 56.4% of all cemented bipolar replacements. The Alloclassic SL is again the most common cementless stem. There are however many more different types of stems used in bipolar prostheses compared to the unipolar modular prostheses (37 cemented and 37 cementless) (Table H12). Of the 17 different bipolar prostheses recorded the

UHR is the most common (50%). There have been no additional new bipolar prostheses used during 2003. The ten most common are listed in Table H13.

Prosthesis Usage and Fixation for Primary Total Hip Replacement

A primary total hip replacement includes conventional hips (stemmed femoral component with separate acetabular component), resurfacing hips and the thrust plate prosthesis. Conventional hips are subdivided into cemented (both components), cementless (both components) and hybrid (only one component is cemented, usually the femoral).

By the end of 2003 the Registry had recorded 51,760 primary total hips. Of these 47,967 (92.7%) were conventional hips (cemented (17.5%), cementless (46.4%) and hybrid (36.1%). Resurfacing hips now account for 7.2% of all primary total hips recorded by the Registry. The thrust plate has only been used on 90 occasions (0.2%). Of the 18,924 new primary total hips reported in 2003, 91.6% were conventional total hips ((cemented (13.9%), cementless (50.7%) and hybrid (35.4%)). In addition there were 8.3% resurfacing and 0.1% thrust plate procedures. These figures suggest that the use of conventional cemented primary total hip has decreased and cementless along with resurfacing hips has increased. State variation in the use of the different primary hips is detailed in Table H14. The figures are slightly different from those reported above as the percentages for cemented, cementless and hybrid hips are calculated as a percentage of all primary hips rather than all conventional primary hips. However there is considerable variation between states. NSW has a very low incidence of cemented conventional total hip (4.6%) and Victoria a high incidence of resurfacing (11.2%) (Table H14). Comparison of this table with the one produced in last year's report confirms the observation that there has been a decline in the use of conventional cemented primary total hip replacement with a decrease being evident in every state except NSW, which has already had by far the lowest rate. Conversely the proportion of cementless hips has increased in every state with the exception of NSW and ACT/NT. The incidence of hybrid hips has remained relatively unchanged and the percentage of resurfacing hips has increased in every state with the exception of WA.

The number of different types of prostheses used continues to increase. During 2003 the number of femoral stems recorded by the Registry for conventional primary hips increased from 128 to 141 (Tables H24) and acetabular components from 105 to 124 (Tables H27). Continued mixing and matching of components has also resulted in a further increase in the number of different combinations being recorded. There are over 700 different combinations; this also includes cementing of some cementless prostheses that the Registry regards as a separate combination.

The Exeter stem remains the most used femoral stem in conventional primary total hip replacement (43.4% (cemented), and 44.1% (hybrid)) (Tables H15 and H17). When cemented resurfacings are included (i.e. all primary cemented femoral components) it is used in 38.6% of procedures (Table H22). When all primary total hip stems are compared (cemented and cementless), the Exeter is still the most common stem (21.8%). This is over three times more than the next most used femoral component, which is the BHR resurfacing (6.6%) (Table H24). There has been an increase in the number of acetabular components used with the Exeter stem. It has now been combined with 51 different acetabular components, which is an additional 13, compared to the 2003 report (Table H15 and H17).

Unlike cemented stems there is no single dominant cementless stem. The ABGII is used most frequently (11.3%). The ten most common cementless stems are used in 67.7% of cementless primary total hips however there are a further 69 stems used for the remaining 32.3% (Table H23). In contrast to the stems only one cemented acetabular component (Contemporary) is in the top ten (Table H27). The Trident is the most common acetabular prosthesis and is used twice as often as the Reflection which is the next most common (Table H27).

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 (see Table H29 for a full list).

The Registry has 9,702 revision hip procedures recorded (85.6% major and 14.4% minor). The most common major revision is replacement of both the acetabular and femoral components (38.2%). The acetabular component however is replaced more often than the femoral component. Major revisions involve the replacement of the acetabular component in 74.0% of procedures and the femoral in 59.0% (Table H28). Minor revisions are principally the exchange of both the acetabular insert and femoral head (68.8%) (Table H29).

When an acetabular component is used in a major revision it is not cemented in 69.1% of procedures. A femoral component is cementless in 61.2% of procedures (Table H30). Bipolar prostheses are used in 1.4% of major revisions most often with a cemented stem (Tables H31 and H32).

The Exeter is the most common revision stem (46.7% of revisions using a cemented femoral component and 18.6% of all revisions using a femoral component). The S-Rom is the next most common stem (24.0% of revisions using a cementless femoral component and 14.9% of all revisions using a femoral component (Tables H37 and H38)). The Trident is the most used acetabular component (18.6% of revisions using a cementless acetabular component and 12.9% of all revisions using an acetabular component) (Tables H39 and H40).

Bilateral Hip Replacement

There are many different potential combinations of bilaterals (Table H42). The Registry has recorded 64,361 primary hip procedures that have been performed on 60,277 patients with 4,084 having primary procedures on both hips at sometime during the period the Registry has been collecting data. A same day bilateral procedure has been performed on 6.9% of these. When bilateral resurfacing hips were performed, 26.8% were same day and for bilateral conventional primary total hips only 5.4% were same day. This equates to 2.4% of all patients who have resurfacings and 0.4% of the patients having conventional primary total hips undergoing a bilateral same day procedure. Apart from the small number of same day bilateral conventional primary total hips that are performed it is unusual for this procedure to be performed on the contralateral side within six weeks of the initial surgery (2.4% of bilateral conventional primary total hips and 0.2% of patients having conventional primary total hips) (Table H42).

Early Outcomes of Primary Hip Replacement

The data in this section are based on revisions of primary procedures recorded by the Registry. Revision is the major end point the Registry uses to identify prosthesis failure. As the Registry commenced implementation in 1999 and has only collected full national data since mid 2002, the revisions of known primaries reported here are all early failures. The value of survival analyses for prostheses will increase as both the number of procedures and the time since the primary procedure increases.

In the 2003 Report the Registry analysed 607 revisions of recorded primary hip procedures. This represented 9.8% of all revisions recorded at that time and was an increase from the 7.9% reported in 2002. This year a further 589 revisions of known primary procedures were reported bringing the total to 1,196 revisions of procedures. This is now 12.3% of all recorded revisions and the 589 new procedures represent 16.8% of the additional 3,503 revisions reported

during 2003. These proportions will increase each year, eventually reaching 100%.

Three different approaches have been used to report revision procedures. The first is the percentage of the total procedures undertaken over the entire time the Registry has recorded data. The second involves reporting the number of revisions arising from the 'risk pool' of components not yet revised. This risk pool is expressed as component years. This measure is a true incidence rate of failure as it takes into account not only whether a revision has occurred but also when. The third approach is the standard survival curve that indicates the proportion of failures over time taking into account those individuals whose prosthesis survival time is unknown i.e. those who have died or whose prosthesis has not been revised at the time of analysis. This is a phenomenon called censoring. The survival curve can also be adjusted for differences due to other factors such as age and gender.

General Comments

There are differences in revision rates depending on the type of hip procedure. Conventional primary total hip has the lowest revision rate and unipolar monoblock the highest (Table H43). There is a statistically significant difference comparing resurfacing and conventional primary total hip replacement used for osteoarthritis (hazard ratio 1.54; 95% CI (1.14,2.09) p-value = 0.0046). This difference is most apparent in patients 55 years of age or older at the time of the primary procedure (hazard ratio 1.67; 95% CI (1.19,2.4) p-value =0.0035). Below this age there is no significant difference in the early revision rate of resurfacing hips compared to conventional total hip during this observational period.

The most common reasons for early revision are dislocation (30.9%), loosening (29.0%), fracture (18.5%) and infection (11.8% (Table H44). The high fracture rate is due to the inclusion of resurfacings in this group. Femoral neck fracture is the principal mode of early failure of this prosthesis. The figure for infection does not represent the infection rate for hip replacement surgery but is the proportion of the early revisions undertaken for infection. Overall, major revisions were performed on 74.8% of occasions (Table H45).

Unipolar monoblock prostheses

These prostheses are principally used in the elderly population with a subcapital fracture of the neck of femur (97.4%). A statistically significant higher revision rate for cementless Austin-Moore compared to the cemented Thompson prosthesis was reported last year. This continues to be the situation. There is a three times greater risk of early revision if an Austin-Moore is used instead of a Thompson prosthesis (HR = 2.89; 95%CI (1.8,4.6) p-value < 0.0001) (Figure H4). The critical element appears to be the use of cement in that Thompson prostheses inserted without cement have a similar failure rate to the Austin-Moore, but if an Austin-Moore is cemented then the incidence of early revision is similar to the cemented Thompson (Table H46). Unlike last year the use of the Austin-Moore is now associated with an increased mortality risk compared to the Thompson (see mortality section). Patients receiving unipolar monoblock prostheses are a high-risk group with respect to associated morbidity and mortality. The increased mortality and much higher risk of early revision associated with the use of the Austin-Moore when compared to the Thompson prosthesis is making it increasingly difficult to justify the continued use of this prosthesis.

Unipolar modular prostheses

Unipolar modular prostheses continue to have a low early revision rate (1.5% revised, 1.3 revisions per 100 observed component years). The majority, 83.2%, have cemented stems. The revision rates for the most commonly used combination of stems and unipolar modular heads are shown in Table H47.

Bipolar prostheses

The overall revision rate for bipolar prostheses is higher than for unipolar modular prostheses (2.1% revised, 1.7 revisions per 100 observed component years) (Table H48). The revision rates for the ten most used stems with bipolar

combinations are detailed in Table H48. Of these only the Omnifit/UHR combination has a statistically higher revision rate compared to the other bipolar prostheses. The revision rate is also higher compared to when the UHR is used with other femoral stems (Omnifit/UHR hazard ratio v other/UHR hazard ratio 2.53; 95%CI (1.15,5.55) p-value = 0.021). This difference appears to be in part related to a higher risk of dislocation. Dislocation is the principal diagnosis in 38.7% of all UHR revisions. When combined with the Omnifit stem, it is 44.4%. Dislocation accounts for 27.5%of the principal diagnoses of revisions associated with the use of all other bipolar prostheses. The Registry has reported the higher revision rate of the Omnifit/UHR previously. The number of revisions reported to the Registry increased during 2003.

Conventional total hip

The proportion of all Registry recorded primary conventional total hips revised during the observation period is 1.7% and 1.1 per 100 observed component years (Table H43). There are differences in revision rates depending on the method of fixation. When considering all procedures, cemented hips are revised less frequently: cemented (1.3% and 0.8 per 100 observed component years); hybrid (1.7% and 1.1 per 100 observed component years); and cementless (1.8% and 1.3 per 100 observed component years). In the 2003 Report the Registry reported a statistically significant difference between cemented hips and the other two forms of fixation. There is now a statistically significant difference not only between cemented and the other two methods of fixation but also now between hybrid and cementless fixation. This analysis has been matched for age and sex for osteoarthritis only and excluding infection as the cause of revision. (Table H49 and Figure H5).

Tables H50–H53 show the early revision rates for the most commonly used prostheses combinations in conventional primary total hip replacement. This is for cemented, cementless and hybrid hips. When considering revisions of femoral stems and acetabular components individually two prostheses have been identified as having higher than anticipated revision rates. They are the Margron femoral stem and The SPH-Blind acetabular shell.

The Margron stem has a 3 fold increased risk of revision in the observational period compared to other cementless stems (hazard ratio 3.15; 95%CI (1.97,5.06) p-value < 0.0001) (Figure H6). Dislocation is the most common reason for these early revisions (66.7%). The revisions have all been in the first twelve months and there have been no revisions of the 134 cases observed for longer than that time.

In discussion with the Company they have made the following comments. “There have been several design modifications that have been instigated together with amendments to the surgical technique to assist the surgeon to more accurately predict the optimal prosthesis stem width and length to implant. When misjudged, this had the potential to result in fracture, aseptic loosening, and stem tip pain. In line with the new Surgical Technique the problem has been rectified by: i) Extending the range of smaller sized stems now available, ii) Amending the surgical technique to use longer rather than wider stem components, iii) Reducing pilot length. This has reduced the chance of distal cortical impingement and thigh pain.

“The potential for dislocation has been significantly reduced by: i) Recent adjustments to the neck profile, with a much improved neck/ball ratio, ii) The adoption of a more conservative post-operative regime. Several dislocations were noticed to be occurring postoperatively despite a fully stable prosthesis at operation. This was thought to relate to an over-enthusiastic immediate return to activity leading to an increased risk of early dislocation. This has improved since recommending a less aggressive post-op regime. These changes have been instigated since December 2003, and the company is sure the flow-on will become obvious in the future”.

The SPH-blind acetabular shell has double the risk of revision compared to other cementless acetabular components (hazard

ratio 2.12; 95%CI (1.34,3.36) p-value < 0.0014) (Figure H7). The principal cause of early revision is dislocation (52.6%). The SPH-Blind shell can be used with a number of different acetabular inserts however there was no difference in the observed period in risk of revision between the three different types of insert.

Orthotech were given the opportunity to review the results and they had the following comments. "Lima developed the 'sandwich' liner which provided a polyethylene encased alumina insert, completely eliminating the incidence of ceramic insertion fracture. This design was the major marketing feature of the SPH Blind Implant, giving reluctant surgeons an opportunity to experiment with the ceramic bearing. The compromise created however is the loss of a protruded hood. Acetabular implant placement is more important to ensure the prevention of dislocation. Newer implant designs have addressed this issue by the development of larger head/liner bearings, with Lima producing the only 36mm head in a 50mm cup."

Resurfacing hip replacement

For this report the Registry has analysed the results of 3,703 resurfacing procedures recorded to 31st December 2003. The proportion revised during the observation period is 1.9% and 1.5 per 100 observed component years (Table H54). The most common reason for failure is femoral neck fracture (66.7%), followed by loosening (19.4%). There did not appear to be any association between the risk of revision and age but there was a statistically significant difference when the results for men and women were compared. Females who have a resurfacing procedure have a 1.9 fold increase risk of being revised compared to males (hazard ratio 1.9; 95%CI (1.12,3.05) p-value = 0.0084).

Registry Recorded Revision to Revision Hip Replacements

The Registry has now recorded 900 revision hip replacements that have undergone subsequent revision. Dislocation is the principal diagnosis for re-revision (35.7%) followed by infection (25.8%) and loosening (22.9%). Most of the cases re-revised for infection are the second stage of a planned two-staged revision. For a variety of reasons analysing outcomes following revision surgery is complex. The nature and extent of the revision, the underlying diagnosis as well as the components used and many others factors will all have important effects on the outcome. Analyses of re-revision procedures similar to those performed for primary hip replacements will be possible as the number increases. It is anticipated that the Registry will commence this analysis in the next report.

Ceramic Femoral Heads

Since 2002 the Registry has reported ceramic femoral head fractures. This followed on from the Zirconia femoral head recall. Most of these prostheses were implanted prior to the establishment of the Registry. The Registry has recorded 19 femoral head fractures. This has increased from the eight reported last year. Of these there are five that have occurred in patients that were previously recorded by the Registry (4 in primary and 1 in a revision procedure). The remainder are cases where the Registry does not have information on the original component but ceramic head fracture is the revision diagnosis.

Of the four primary ceramic head failures where the original component is known two were V40 heads, both used with an Omnifit stem, and the others were a C-Taper and a Reflection femoral head. The one fracture of a ceramic femoral head following a revision procedure was a V40 head.

Revision for Dislocation and its relationship to Femoral Head Size and Fixation of the Acetabular Component

In previous years the Registry has provided information on femoral head size and its relation to risk of revision for dislocation. There has been clear association between increasing femoral head size (with the exception of the 26 mm head) and a reduced risk of revision. The analysis has been limited to those patients having a primary hip replacement for osteoarthritis. The analysis of this year's data confirms the trend reported last year (p-value < 0.0001) (Table H55).

A further association has now been established with respect to risk of revision for dislocation. Revision for dislocation is more frequent if a cementless acetabular component is used compared to a cemented component. This has been adjusted for age, sex and femoral head size (hazard ratio 1.68; 95%CI (1.16,2.41) p=0.0056) (Table H56).

Hip Replacement - 1/9/1999 to 31/12/2003

Table H1: Number of Hip Replacements by sex

Type of hip replacement	***Female***		***Male***		***Total***	
	Number	*%*	*Number*	*%*	*Number*	*%*
Primary Partial Hip	9453	12.8	3148	4.3	12601	17.0
Primary Total Hip	27484	37.1	24276	32.8	51760	69.9
Revision Hip	5260	7.1	4442	6.0	9702	13.1
Total	**42197**	**57.0**	**31866**	**43.0**	**74063**	**100.0**

Note: *percents shown are of 74063*
In some tables entries may not sum to totals due to rounding

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*

Demographic characteristics of patients undergoing Hip Replacement

1/9/1999 to 31/12/2003

Table H2: Summary statistics of age (by sex) for All Hip Replacements

	Female *N=42197 (57.0%)*	***Male*** *N=31866 (43.0%)*	***All Patients*** *N=74063 (100.0%)*
Median	74	69	72
Minimum	14	13	13
Maximum	105	107	107
Mean	71.9	67.3	69.9
Standard Deviation	12.5	12.4	12.7

Table H3: Summary statistics of age (by sex) for Primary Partial Hip Replacement

	Female *N=9453 (75.0%)*	***Male*** *N=3148 (25.0%)*	***All Patients*** *N=12601 (100.0%)*
Median	83	82	82
Minimum	20	17	17
Maximum	105	107	107
Mean	81.7	80.5	81.4
Standard Deviation	8.6	9.3	8.8

Figure H1: Age and Sex - Primary Partial Hip Replacement

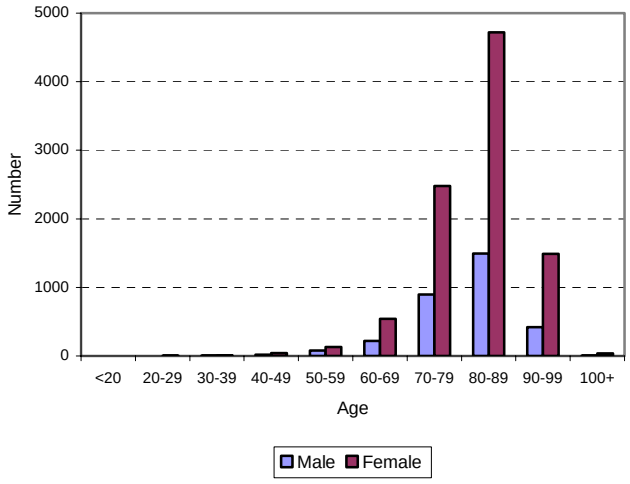


Table H4: Summary statistics of age (by sex) for Primary Total Hip Replacement

	All Primary Total			*Resurfacing Hips*			*Total Hip (excl Resurfacing)*		
	Female	***Male***	***All Patients***	***Female***	***Male***	***All Patients***	***Female***	***Male***	***All Patients***
Number	*27484*	*24276*	*51760*	*1135*	*2568*	*3703*	*26349*	*21708*	*48057*
%	*(53.1)*	*(46.9)*	*(100.0)*	*(30.7)*	*(69.3)*	*(100.0)*	*(54.8)*	*(45.2)*	*(100.0)*
Median	71	66	68	53	54	54	71	68	69
Minimum	14	13	13	14	13	13	14	16	14
Maximum	100	102	102	78	81	81	100	102	102
Mean	68.6	65.1	67.0	51.6	53.8	53.1	69.4	66.4	68.1
Standard Deviation	11.8	11.8	11.9	9.4	9.9	9.8	11.4	11.2	11.4

Figure H2: Age and Sex - Primary Total Hip Replacement

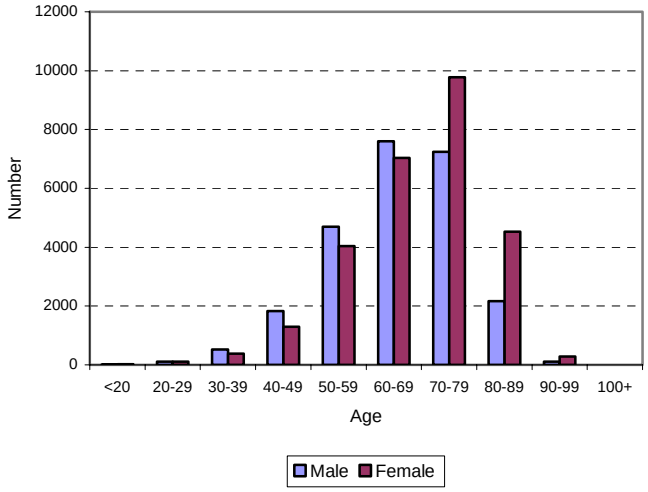


Table H5: Summary statistics of age (by sex) for Revision Hip Replacement

	Female *N=5260 (54.2%)*	***Male*** *N=4442 (45.8%)*	***All Patients*** *N=9702 (100.0%)*
Median	73	72	73
Minimum	22	21	21
Maximum	100	97	100
Mean	71.2	70.0	70.7
Standard Deviation	12.3	11.4	11.9

Figure H3: Age and Sex - Revision Hip Replacement

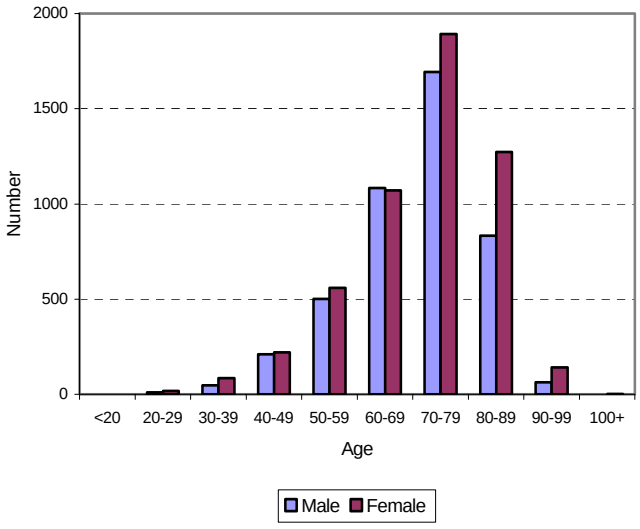


Table H6: Principal Diagnosis - Partial Hip Replacement

Principal Diagnosis	*Number*	*%*
Fractured Neck of Femur	11907	94.5
Osteoarthritis	342	2.7
Tumour	187	1.5
Avascular Necrosis	68	0.5
Failed Internal Fixation	67	0.5
Developmental Dysplasia	18	0.1
Rheumatoid Arthritis	11	0.1
Other	1	0.0
Total	**12601**	**100.0**

Table H7: Principal Diagnosis - Primary Total Hip Replacement

Principal Diagnosis	*Number*	*%*
Osteoarthritis	45616	88.1
Avascular Necrosis	2219	4.3
Fractured Neck of Femur	1332	2.6
Rheumatoid Arthritis	909	1.8
Developmental Dysplasia	833	1.6
Other Inflammatory Arthritis	328	0.6
Tumour	283	0.5
Failed Internal Fixation	154	0.3
Fracture/Dislocation	35	0.1
Arthrodesis Takedown	31	0.1
Other	20	0.0
Total	**51760**	**100.0**

Table H8: Diagnosis - Revision Hip Replacement

Diagnosis	*Number*	*%*
Loosening	5575	49.5
Dislocation Of Prosthesis	1688	15.0
Lysis	1133	10.1
Fracture	937	8.3
Infection	855	7.6
Wear Acetabulum	375	3.3
Pain	208	1.8
Implant Breakage Acetabular	175	1.6
Implant Breakage Stem	97	0.9
Implant Breakage Head	19	0.2
Other	199	1.8
Total	**11261**	**100.0**

Note: *some patients had multiple diagnoses*

Prosthesis Fixation and Usage for Partial Hip Replacement

1/9/1999 to 31/12/2003

Table H9: Prosthesis fixation - Partial Hip Replacement

Fixation	*Unipolar Monoblock*		*Unipolar Modular*		*Bipolar*		*All Patients*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Cemented	1557	12.4	1268	10.1	2952	23.4	5777	45.8
Cementless	6122	48.6	256	2.0	446	3.5	6824	54.2
Total	**7679**	**60.9**	**1524**	**12.1**	**3398**	**27.0**	**12601**	**100.0**

Table H10: Prosthesis Usage - Partial Hip Replacement - Unipolar Monoblock

	Unipolar Monoblock	*Number*	*%*
Cemented	Austin-Moore Type	95	1.2
	Thompson Type	1462	19.0
Cementless	Austin-Moore Type	5941	77.4
	Thompson Type	181	2.4
Total		**7679**	**100.0**

Table H11: Prosthesis Usage - Partial Hip Replacement - Unipolar Modular

	Unipolar Modular		*Number*	*%*
	Stem	*Unipolar Head*		
Cemented Stem	Exeter	Unitrax	330	26.0
	Spectron EF	Unipolar Head *(S&N)*	207	16.3
		Unitrax	6	0.5
	CPT	Unipolar Type *(Zimmer)*	138	10.9
		VerSys Endo	51	4.0
		Other (1)	2	0.2
	CCA	Hemi Head *(Mathys)*	164	12.9
	Other (16)	-	370	29.2
Total Cemented			**1268**	**100.0**
Cementless Stem	Alloclassic SL	Unipolar Head *(Sulzer)*	125	48.8
		Unipolar Ballhead *(Sulzer)*	8	3.1
	Alloclassic	Unipolar Head *(Sulzer)*	47	18.4
		Unipolar Ballhead *(Sulzer)*	2	0.8
	SL-Plus	Unipolar Head *(Endoprothetik)*	38	14.8
	VerSys	VerSys Endo	8	3.1
	Other (12)	-	28	10.9
Total Cementless			**256**	**100.0**
Total Unipolar			**1524**	**100.0**

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

Table H12: Prosthesis Usage - Partial Hip Replacement - Bipolar

	Bipolar		***Number***	***%***
	Stem	*Bipolar Prosthesis*		
Cemented Stem	Exeter	UHR	1347	45.6
		Centrax	265	9.0
		Other (4)	53	1.8
	Elite Plus	Hastings	214	7.2
		Endo Cup *(Depuy)*	120	4.1
		Other (2)	9	0.3
	Omnifit	UHR	183	6.2
		Centrax	6	0.2
		Other (1)	2	0.1
	C-Stem	Hastings	98	3.3
		Endo Cup *(Depuy)*	41	1.4
		Other (1)	2	0.1
	Spectron EF	Convene	132	4.5
		Centrax	3	0.1
		Other (2)	3	0.1
	Other (32)	-	474	16.1
Total Cemented			**2952**	**100.0**
Cementless Stem	Alloclassic SL	Bipolar Ballhead *(Sulzer)*	68	15.2
		Endo Cup *(Depuy)*	1	0.2
	ABGII	UHR	49	11.0
		Endo Cup *(Depuy)*	8	1.8
		Other (1)	1	0.2
	Alloclassic	Bipolar Ballhead *(Sulzer)*	55	12.3
	Corail	Hastings	26	5.8
		Endo Cup *(Depuy)*	5	1.1
		Other (1)	1	0.2
	Mallory-Head	Centrax	11	2.5
		UHR	8	1.8
		Other (1)	5	1.1
	Other (32)	-	208	46.6
Total Cementless			**446**	**100.0**
Total			**3398**	**100.0**

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

Table H13: Top Ten Bipolar Prostheses used in Primary Partial Hip Replacement

Bipolar Prosthesis	***Number***	***%***
UHR	1699	50.0
Hastings	437	12.9
Centrax	304	8.9
Convene	273	8.0
Endo Cup *(Depuy)*	194	5.7
Bipolar Ballhead *(Sulzer)*	174	5.1
Bipolar Head *(Mathys)*	75	2.2
Multipolar Bipolar	66	1.9
Bipolar Type *(Zimmer)*	61	1.8
Bipolar Type *(Biomet)*	45	1.3
Other (7)	70	2.1
Total	**3398**	**100.0**

Prosthesis Fixation and Usage for Primary Total Hip Replacement

1/9/1999 to 31/12/2003

Table H14: Prosthesis Fixation - Primary Total Hip Replacement, by State

Prosthesis Fixation	*Conventional Hips*						*Resurfacing/ Thrust Plate*		*Total*	
	Cemented		*Cementless*		*Hybrid*					
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
ACT/NT	56	5.3	620	59.0	308	29.3	67	6.4	1051	100.0
NSW	600	4.6	7444	57.1	3990	30.6	998	7.7	13032	100.0
QLD	2959	36.3	1908	23.4	2933	35.9	362	4.4	8162	100.0
SA	1455	21.7	2136	31.9	2673	39.9	436	6.5	6700	100.0
TAS	233	12.0	1442	74.5	246	12.7	15	0.8	1936	100.0
VIC	2526	17.1	5733	38.8	4879	33.0	1655	11.2	14793	100.0
WA	563	9.3	2982	49.0	2281	37.5	260	4.3	6086	100.0
Australia	**8392**	**16.2**	**22265**	**43.0**	**17310**	**33.4**	**3793**	**7.3**	**51760**	**100.0**

Note: *There are only 90 thrust plate procedures recorded by the Registry*

Table H15: Prosthesis Usage - Primary Total Hip Replacement where both the Femoral and Acetabular components were Cemented

Femoral Component	*Acetabular Component*	*Number*	*%*
Exeter	Contemporary	2051	24.4
	Exeter	1158	13.8
	Elite Plus Ogee	175	2.1
	Other (20)	260	3.1
Charnley	Charnley Ogee	375	4.5
	Charnley	275	3.3
	Charnley LPW	197	2.3
	Other (1)	1	0.0
Spectron EF	Reflection	686	8.2
	Apollo	59	0.7
	Brunswick	21	0.3
	Other (5)	29	0.3
C-Stem	Elite Plus LPW	212	2.5
	Charnley	200	2.4
	Charnley Ogee	136	1.6
	Other (8)	192	2.3
Elite Plus	Charnley Ogee	200	2.4
	Elite Plus Ogee	111	1.3
	Charnley LPW	89	1.1
	Other (11)	243	2.9
MS 30	Low Profile Cup	437	5.2
	Apollo	95	1.1
	Allofit	3	0.0
	Other (4)	6	0.1
CPT	ZCA	274	3.3
	Reflection	29	0.3
	Contemporary	2	0.0
	Other (3)	4	0.0
Omnifit	Contemporary	110	1.3
	Omnifit	107	1.3
	Low Profile Cup	3	0.0
	Other (5)	9	0.1
CPCS	Reflection	160	1.9
	Opera	13	0.2
CCA	CCB Special Cup	70	0.8
	CCB	17	0.2
	Low Profile Cup	1	0.0
Other (26)	-	382	4.6
Total		**8392**	**100.0**

Note: *femoral model name not repeated but usage continues down the column until change of model name other (n) equals the number of other types of prostheses*

Table H16: Prosthesis Usage - Primary Total Hip Replacement where the Femoral and Acetabular components were Cementless

Femoral Component	*Acetabular Component*	*Number*	*%*
ABGII	ABGII	1848	8.3
	Trident	476	2.1
	Option	135	0.6
	Other (8)	93	0.4
Synergy	Reflection	2137	9.6
	Trident	16	0.1
	ABGII	9	0.0
	Other (7)	15	0.1
Secur-Fit Plus	Trident	1641	7.4
	Secur-Fit	128	0.6
	Omnifit	40	0.2
	Other (9)	32	0.1
Alloclassic SL	Allofit	805	3.6
	Fitmore	400	1.8
	Morscher	286	1.3
	Other (10)	184	0.8
VerSys	Trilogy	1502	6.7
	Duraloc	30	0.1
	Hedrocel	9	0.0
	Other (4)	18	0.1
Secur-Fit	Trident	1160	5.2
	Secur-Fit	113	0.5
	Omnifit	83	0.4
	Other (2)	7	0.0
S-Rom	Option	445	2.0
	Pinnacle	170	0.8
	S-Rom	153	0.7
	Other (19)	453	2.0
Omnifit	Trident	621	2.8
	Secur-Fit	373	1.7
	Trilogy	49	0.2
	Other (3)	36	0.2
Mallory-Head	Mallory-Head	923	4.1
	M2a	58	0.3
	Bihapro	13	0.1
	Other (5)	7	0.0
Corail	Duraloc	368	1.7
	Option	207	0.9
	Pinnacle	123	0.6
	Other (6)	18	0.1
Other (66)	-	7081	31.8
Total		**22265**	**100.0**

Note: *femoral model name not repeated but usage continues down the column until change of model name other (n) equals the number of other types of prostheses*

Table H17: Prosthesis Usage - Hybrid -Primary Total Hip Replacement where the Femoral component was Cemented and the Acetabular component was Cementless

Femoral Component	*Acetabular Component*	*Number*	*%*
Exeter	Trident	2842	16.6
	Vitalock	2461	14.3
	ABGII	841	4.9
	Other (25)	1480	8.6
Spectron EF	Reflection	1694	9.9
	Duraloc	59	0.3
	ABGII	23	0.1
	Other (10)	73	0.4
Elite Plus	Duraloc	883	5.1
	Trident	140	0.8
	Mallory-Head	125	0.7
	Other (13)	259	1.5
CPT	Trilogy	1099	6.4
	S-Rom	32	0.2
	Reflection	8	0.0
	Other (4)	7	0.0
Omnifit	Trident	725	4.2
	Secur-Fit	243	1.4
	Trilogy	58	0.3
	Other (6)	15	0.1
MS 30	Allofit	326	1.9
	Fitmore	260	1.5
	Duraloc	45	0.3
	Other (13)	92	0.5
C-Stem	Duraloc	486	2.8
	Option	75	0.4
	RM Cup Ceros	48	0.3
	Other (8)	58	0.3
Definition	Vitalock	341	2.0
	Trident	124	0.7
	ABGII	21	0.1
	Other (2)	2	0.0
Charnley	Vitalock	313	1.8
	Duraloc	140	0.8
	Secur-Fit	3	0.0
	Other (1)	1	0.0
VerSys	Trilogy	373	2.2
	Hedrocel	5	0.0
	Mallory-Head	3	0.0
	Other (2)	2	0.0
Other (41)	-	1366	8.0
Total		**17151**	**100.0**

Note: *femoral model name not repeated but usage continues down the column until change of model name other (n) equals the number of other types of prostheses*

Table H18: Prosthesis Usage - Hybrid - Primary Total Hip Replacement where the Femoral component was Cementless and the Acetabular component was Cemented

Femoral Component	*Acetabular Component*	*Number*	*%*
Alloclassic SL	Apollo	16	10.1
	Other (9)	12	7.5
S-Rom	CCB Special Cup	5	3.1
	Other (13)	21	13.2
Corail	Elite Plus LPW	9	5.7
	Other (3)	6	3.8
CLS	Allofit	2	1.3
	Other (4)	6	3.8
Mallory-Head	Bioclad	2	1.3
	Other (5)	6	3.8
Alloclassic	Apollo	5	3.1
	Other (1)	1	0.6
Synergy	Reflection	5	3.1
	Other (1)	1	0.6
ABGII	Contemporary	3	1.9
	Other (2)	2	1.3
Natural Hip	Artek	2	1.3
	Other (3)	3	1.9
Accolade	Contemporary	3	1.9
	Other (1)	1	0.6
Other (29)	-	48	30.2
Total		**159**	**100.0**

Note: *femoral model name not repeated but usage continues down the column until change of model name other (n) equals the number of other types of prostheses*

Table H19: Prosthesis Usage - Hybrid - Primary Total Hip Replacement where the Femoral component was Cementless and the Acetabular component was Cemented, Top ten combinations

Femoral Component	*Acetabular Component*	*Number*	*%*
Alloclassic SL	Apollo	16	10.1
Corail	Elite Plus LPW	9	5.7
Alloclassic	Apollo	5	3.1
S-Rom	CCB Special Cup	5	3.1
Synergy	Reflection	5	3.1
Alloclassic SL	Low Profile Cup	4	2.5
ABGII	Contemporary	3	1.9
Accolade	Contemporary	3	1.9
CBC Stem	CBF Cup	3	1.9
Corail	Duraloc	3	1.9
Other (79)	-	103	64.8
Total		**159**	**100.0**

Note: *other (n) equals the number of other types of prostheses*

Table H20: Other types of Primary Hip Replacements - Resurfacing Head

Resurfacing Head	*Cup*	*Number*	*%*
BHR	BHR	3425	92.5
Cormet 2000	Cormet 2000	160	4.3
Metasul RS	Metasul RS	58	1.6
ASR	ASR	43	1.2
Conserve Plus	Conserve Plus	15	0.4
Conserve	-	2	0.1
Total Resurfacing		**3703**	**100.0**

Note: *2 conserves were inserted without cups*

Table H21: Other types of Primary Hip Replacements - Thrust Plate

Thrust Plate	*Shell/Cup*	*Number*	*%*
TPP	Fitmore	77	85.6
	Allofit	8	8.9
	Artek	5	5.6
Total Thrust Plate		**90**	**100.0**

Top Ten Femoral and Acetabular Components used for Primary Total Hip Replacement - 1/9/1999 to 31/12/2003

Table H22: Top Ten Cemented Femoral components used in Primary Total Hip Replacement

Femoral Component	*Number*	*%*
Exeter	11268	38.6
BHR	3425	11.7
Spectron EF	2644	9.1
Elite Plus	2050	7.0
CPT	1455	5.0
C-Stem	1407	4.8
Charnley	1305	4.5
Omnifit	1270	4.4
MS 30	1264	4.3
Definition	563	1.9
Other (52)	2541	8.7
Total	**29192**	**100.0**

Note: *includes resurfacing components and thrust plates*

Table H23: Top Ten Cementless Femoral components used in Primary Total Hip Replacement

Femoral Component	*Number*	*%*
ABGII	2557	11.3
Synergy	2183	9.7
Secur-Fit Plus	1843	8.2
Alloclassic SL	1703	7.5
VerSys	1560	6.9
Secur-Fit	1366	6.1
S-Rom	1247	5.5
Omnifit	1082	4.8
Mallory-Head	1009	4.5
Corail	731	3.2
Other (69)	7287	32.3
Total	**22568**	**100.0**

Note: *includes resurfacing components and thrust plates*

Table H24: Top Ten Femoral components used in Primary Total Hip Replacement

Femoral Component		*Number*	*%*
Exeter	*Cemented*	11268	21.8
BHR	*Cemented*	3425	6.6
Spectron EF	*Cemented*	2644	5.1
ABGII	*Cementless*	2557	4.9
Synergy	*Cementless*	2183	4.2
Elite Plus	*Cemented*	2050	4.0
Secur-Fit Plus	*Cementless*	1843	3.6
Alloclassic SL	*Cementless*	1703	3.3
VerSys	*Cementless*	1560	3.0
CPT	*Cemented*	1455	2.8
Other (131)		21072	40.7
Total		**51760**	**100.0**

Table H25: Top Ten Cemented Acetabular components used in Primary Total Hip Replacement

Acetabular Component	*Number*	*%*
Contemporary	2219	25.9
Exeter	1178	13.8
Reflection	924	10.8
Charnley Ogee	715	8.4
Charnley	555	6.5
Low Profile Cup	480	5.6
Elite Plus Ogee	454	5.3
ZCA	322	3.8
Elite Plus LPW	318	3.7
Charnley LPW	295	3.4
Other (47)	1093	12.8
Total	**8553**	**100.0**

Table H26: Top Ten Cementless Acetabular components used in Primary Total Hip Replacement

Acetabular Component	*Number*	*%*
Trident	8692	20.1
Reflection	4449	10.3
Vitalock	3919	9.1
Trilogy	3633	8.4
BHR	3524	8.2
Duraloc	3021	7.0
ABGII	2860	6.6
Mallory-Head	2526	5.8
Allofit	1810	4.2
Fitmore	1727	4.0
Other (57)	7046	16.3
Total	**43207**	**100.0**

Table H27: Top Ten Acetabular components used in Primary Total Hip Replacement

Acetabular Component		*Number*	*%*
Trident	*Cementless*	8692	16.8
Reflection	*Cementless*	4449	8.6
Vitalock	*Cementless*	3919	7.6
Trilogy	*Cementless*	3633	7.0
BHR	*Cementless*	3524	6.8
Duraloc	*Cementless*	3021	5.8
ABGII	*Cementless*	2860	5.5
Mallory-Head	*Cementless*	2526	4.9
Contemporary	*Cemented*	2219	4.3
Allofit	*Cementless*	1810	3.5
Other (114)		15107	29.2
Total		**51760**	**100.0**

Prosthesis Fixation and Usage for Revision Hip Replacement

1/9/1999 to 31/12/2003

Table H28: Components Used - Major Revision Hip

Component Used	*Number*	*%*
Femoral and Acetabular	3178	38.2
Acetabular Component Only	2974	35.8
Femoral Component Only	1730	20.8
Cement Spacer	168	2.0
Removal Prosthesis	131	1.6
Bipolar head & Femoral Comp	119	1.4
Reinsertion of Components	9	0.1
Total	**8309**	**100.0**

Table H29: Components Used - Minor Revision Hip

Component Used	*Number*	*%*
Head/Insert	959	68.8
Head Only	178	12.8
Insert only	117	8.4
Cable/Other Minor Components	116	8.3
Bipolar Head Only	20	1.4
Locking Ring only	3	0.2
Total	**1393**	**100.0**

Table H30: Prosthesis Fixation - Major Revision Hip Replacement

Component Used	*Cementless*		*Cemented*		*Hybrid*		*N/A*		*Total*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Femoral Component Only	1185	14.5	545	6.7	.	.	.	.	1730	21.1
Acetabular Component Only	2074	25.3	900	11.0	.	.	.	.	2974	36.3
Femoral and Acetabular	1540	18.8	713	8.7	925	11.3	.	.	3178	38.8
Reinsertion of Components	7	0.1	2	0.0	.	.	.	.	9	0.1
Prosthesis not reinserted	.	.	.	.	.	.	299	3.7	299	3.7
Total	**4806**	**58.7**	**2160**	**26.4**	**925**	**11.3**	**299**	**3.7**	**8190**	**100.0**

Note: *N/A means not applicable,*
. *no hip component was used.*

Table H31: Prosthesis Fixation - Bipolar - Major Revision Hip Replacement

Component Used	*Cementless Stem*		*Cemented Stem*		*Total*	
	Number	*%*	*Number*	*%*	*Number*	*%*
Bipolar head and Stem	31	26.1	88	73.9	119	100.0
Total	**31**	**26.1**	**88**	**73.9**	**119**	**100.0**

Table H32: Prosthesis Usage - Bipolar - Major Revision Hip Replacement

Femoral Component	*Bipolar*	*Number*	*%*
Exeter	UHR	43	36.1
	Centrax	13	10.9
	Hastings	3	2.5
Charnley	Hastings	8	6.7
S-Rom	Hastings	4	3.4
	Bipolar Head *(Mathys)*	1	0.8
	Endo Cup *(Depuy)*	1	0.8
HNR	UHR	5	4.2
ZMR	Bipolar Type *(Zimmer)*	2	1.7
	UHR	2	1.7
	Bipolar Head *(Mathys)*	1	0.8
C-Stem	Endo Cup *(Depuy)*	2	1.7
	Hastings	1	0.8
Mallory-Head	Bipolar Type *(Biomet)*	2	1.7
	Centrax	1	0.8
Omnifit	UHR	2	1.7
	Centrax	1	0.8
PFM-R	Bipolar Ballhead *(Sulzer)*	3	2.5
Other (15)	-	24	20.2
Total		**119**	**100.0**

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

Table H33: Prosthesis Usage - Cemented Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral Only	Exeter	-	199	9.2
	Spectron EF	-	51	2.4
	Elite Plus	-	48	2.2
	CPT	-	39	1.8
	Charnley	-	27	1.3
	Other (40)	-	181	8.4
Acetabular Only	-	Contemporary	168	7.8
	-	Reflection	130	6.0
	-	Exeter	65	3.0
	-	ZCA	59	2.7
	-	Omnifit	45	2.1
	-	Other (44)	433	20.1
Femoral & Acetabular	Exeter	Contemporary	239	11.1
	Exeter	Exeter	80	3.7
	Spectron EF	Reflection	39	1.8
	Elite Plus	Elite Plus Ogee	18	0.8
	Charnley	Charnley	16	0.7
	Other (109)	Other	321	14.9
Total			**2158**	**100.0**

Note: *femoral model name not repeated but usage continues down the column until change of model name - equals no component exchanged*

Table H34: Prosthesis Usage - Cementless Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral Only	S-Rom	-	280	5.8
	ZMR	-	157	3.3
	Restoration	-	135	2.8
	Solution	-	84	1.8
	Mallory-Head	-	66	1.4
	Other (47)	-	463	9.6
Acetabular Only	-	Trident	403	8.4
	-	Trilogy	276	5.8
	-	Secur-Fit	254	5.3
	-	Mallory-Head	195	4.1
	-	Reflection	171	3.6
	-	Other (46)	775	16.1
Femoral & Acetabular	ZMR	Trilogy	163	3.4
	Restoration	Trident	120	2.5
	Mallory-Head	Mallory-Head	83	1.7
	Echelon	Reflection	81	1.7
	Revision Hip	SPH-Blind	74	1.5
	Other (211)	Other	1019	21.2
Total			**4799**	**100.0**

Note: *femoral model name not repeated but usage continues down the column until change of model name - equals no component exchanged*

Table H35: Prosthesis Usage - Hybrid (stem cemented) Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral & Acetabular	Exeter	Trident	99	15.4
	Exeter	Vitalock	81	12.6
	CPT	Trilogy	79	12.3
	Spectron EF	Reflection	46	7.2
	Exeter	Secur-Fit	33	5.1
	Other (84)	Other	304	47.4
Total			**642**	**100.0**

Table H36: Prosthesis Usage - Hybrid (cup cemented) Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral & Acetabular	Restoration T3	Contemporary	21	7.4
	Echelon	Reflection	20	7.1
	ZMR	ZCA	14	4.9
	Revision Hip	Mueller	13	4.6
	S-Rom	Contemporary	12	4.2
	Other (89)	Other	203	71.7
Total			**283**	**100.0**

Top Ten Femoral and Acetabular Components used for Revision Hip Replacement - 1/9/1999 to 31/12/2003

Table H37: Top Ten Cemented Stem components used in Revision Hip Replacement

Cemented Stems	*Number*	*%*
Exeter	928	46.7
Spectron EF	170	8.6
CPT	141	7.1
Elite Plus	121	6.1
Omnifit	84	4.2
Charnley	83	4.2
C-Stem	70	3.5
MS 30	52	2.6
VerSys	35	1.8
HNR	25	1.3
Other (46)	279	14.0
Total	**1988**	**100.0**

Table H38: Top Ten Cementless Stem components used in Revision Hip Replacement

Cementless Stems	*Number*	*%*
S-Rom	728	24.0
ZMR	400	13.2
Restoration	344	11.3
Revision Hip	191	6.3
Mallory-Head	190	6.3
Echelon	179	5.9
PFM-R	157	5.2
Solution	140	4.6
Restoration T3	130	4.3
Margron	65	2.1
Other (55)	515	16.9
Total	**3039**	**100.0**

Table H39: Top Ten Cemented Acetabular components used in Revision Hip Replacement

Cemented Acetabular	*Number*	*%*
Contemporary	494	26.1
Reflection	230	12.1
Exeter	162	8.5
ZCA	96	5.1
Elite Plus Ogee	95	5.0
Low Profile Cup	84	4.4
Omnifit	72	3.8
Brunswick	69	3.6
Charnley	67	3.5
CCB	55	2.9
Other (44)	472	24.9
Total	**1896**	**100.0**

Table H40: Top Ten Cementless Acetabular components used in Revision Hip Replacement

Cementless Acetabular	*Number*	*%*
Trident	793	18.6
Trilogy	588	13.8
Secur-Fit	430	10.1
Mallory-Head	371	8.7
Reflection	367	8.6
Duraloc	344	8.1
Vitalock	276	6.5
SPH-Blind	149	3.5
Omnifit	138	3.2
Allofit	113	2.7
Other (53)	687	16.1
Total	**4256**	**100.0**

Table H41: Prosthesis Usage - Minor Revision Hip Replacement Ten most common inserts used

Insert	*Number*	*%*
Duraloc	122	11.4
Trident	112	10.4
HGPII	109	10.1
Reflection	96	8.9
Constrained Insert (Osteonics)	92	8.6
PCA	78	7.3
Longevity	76	7.1
Omnifit	76	7.1
Mallory-Head	63	5.9
Ringloc	35	3.3
Other (31)	215	20.0
Total	**1074**	**100.0**

Bilateral Hip Replacement - 1/9/1999 to 31/12/2003

Table H42: 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	.	.	1	0.0	2	0.0	11	0.3	20	0.5	34	0.8
	Unipolar Mono	.	.	.	.	1	0.0	5	0.1	9	0.2	15	0.4
	Unipolar Modular	.	.	.	.	.	.	.	.	4	0.1	4	0.1
	Total Hip	.	.	1	0.0	1	0.0	5	0.1	8	0.2	15	0.4
Unipolar Mono	Bipolar	.	.	.	.	1	0.0	.	.	2	0.0	3	0.1
	Unipolar Mono	4	0.1	5	0.1	10	0.2	45	1.1	67	1.6	131	3.2
	Unipolar Modular	.	.	.	.	.	.	7	0.2	5	0.1	12	0.3
	Total Hip	.	.	.	.	.	.	5	0.1	3	0.1	8	0.2
Unipolar Modular	Bipolar	.	.	.	.	.	.	3	0.1	2	0.0	5	0.1
	Unipolar Mono	.	.	.	.	1	0.0	2	0.0	3	0.1	6	0.1
	Unipolar Modular	2	0.0	.	.	1	0.0	8	0.2	10	0.2	21	0.5
	Total Hip	.	.	.	.	.	.	1	0.0	.	.	1	0.0
Resurfacing	Resurfacing	88	2.2	15	0.4	2	0.0	97	2.4	126	3.1	328	8.0
	Total Hip	.	.	.	.	.	.	3	0.1	9	0.2	12	0.3
Thrust Plate	Thrust Plate	.	.	.	.	.	.	4	0.1	7	0.2	11	0.3
Total Hip	Bipolar	1	0.0	.	.	1	0.0	4	0.1	10	0.2	16	0.4
	Unipolar Mono	.	.	.	.	.	.	3	0.1	8	0.2	11	0.3
	Unipolar Modular	.	.	.	.	.	.	.	.	1	0.0	1	0.0
	Resurfacing	2	0.0	1	0.0	.	.	1	0.0	17	0.4	21	0.5
	Total Hip	186	4.6	41	1.0	40	1.0	1214	29.7	1948	47.7	3429	84.0
Total		**283**	**6.9**	**64**	**1.6**	**60**	**1.5**	**1418**	**34.7**	**2259**	**55.3**	**4084**	**100.0**

Table H43: Revision by Type of Primary Hip Replacement

	Number Revised	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Unipolar Monoblock	234	7679	3.0	8867	2.6	(2.31, 3.00)
Unipolar Modular	23	1524	1.5	1765	1.3	(0.83, 1.95)
Bipolar	71	3398	2.1	4061	1.7	(1.37, 2.21)
Total Hip	796	47967	1.7	70930	1.1	(1.05,1.20)
Cemented Total	*105*	*8392*	*1.3*	*13995*	*0.8*	*(0.61, 0.91)*
Cementless Total	*401*	*22265*	*1.8*	*30698*	*1.3*	*(1.18, 1.44)*
Hybrid	*290*	*17310*	*1.7*	*26237*	*1.1*	*(0.98, 1.24)*
Resurfacing Hip	70	3703	1.9	4666	1.5	(1.17,1.90)
Thrust plates	2	90	2.2	162	1.2	(0.15,4.45)

Table H44: Days to Revision by Revision Diagnosis

Diagnosis	***Days to Revision Procedure***										***Total***	
	Same Day		*<2 weeks*		*2-6 weeks*		*6 weeks - 1 year*		*>1 year*			
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Dislocation of Prosthesis	3	0.2	54	4.2	109	8.4	166	12.8	67	5.2	399	30.9
Fracture	2	0.2	35	2.7	63	4.9	120	9.3	19	1.5	239	18.5
Implant Breakage Acetabular	.	.	.	.	.	.	3	0.2	1	0.1	4	0.3
Implant Breakage Head	.	.	.	.	.	.	3	0.2	1	0.1	4	0.3
Implant Breakage Stem	.	.	.	.	3	0.2	3	0.2	2	0.2	8	0.6
Infection	.	.	1	0.1	28	2.2	85	6.6	38	2.9	152	11.8
Loosening	.	.	27	2.1	35	2.7	201	15.5	112	8.7	375	29.0
Lysis	.	.	.	.	1	0.1	9	0.7	5	0.4	15	1.2
Pain	.	.	1	0.1	2	0.2	22	1.7	19	1.5	44	3.4
Wear Acetabulum	.	.	.	.	1	0.1	4	0.3	3	0.2	8	0.6
Other	2	0.2	13	1.0	4	0.3	16	1.2	10	0.8	45	3.5
Total	**7**	**0.5**	**131**	**10.1**	**246**	**19.0**	**632**	**48.9**	**277**	**21.4**	**1293**	**100**

Note: *Revision procedures may have more than one diagnosis*

Table H45: Primary to Revision procedure types

Primary	*Revision*	*Number*	*%*
Bipolar	Femoral Component Only	7	0.6
	Acetabular Component Only	29	2.4
	Femoral and Acetabular	10	0.8
	Removal Prosthesis	2	0.2
	Bipolar head & Femoral Comp	9	0.8
	Bipolar Head Only	10	0.8
	Cable/Other Minor Components	4	0.3
Unipolar Monoblock	Femoral Component Only	38	3.2
	Femoral and Acetabular	137	11.5
	Removal Prosthesis	10	0.8
	Cement Spacer	8	0.7
	Bipolar head and Femoral Comp	38	3.2
	Cable/Other Minor Components	2	0.2
	Reinsertion of Components	1	0.1
Unipolar Modular	Femoral Component Only	3	0.3
	Acetabular Component Only	10	0.8
	Femoral and Acetabular	4	0.3
	Removal Prosthesis	1	0.1
	Cement Spacer	1	0.1
	Bipolar Head Only	1	0.1
	Cable/Other Minor Components	3	0.3
Total Hip	Femoral Component Only	192	16.1
	Acetabular Component Only	208	17.4
	Femoral and Acetabular	70	5.9
	Removal Prosthesis	14	1.2
	Cement Spacer	27	2.3
	Bipolar Head Only	1	0.1
	Head/Insert	176	14.7
	Insert only	19	1.6
	Head Only	62	5.2
	Cable/Other Minor Components	24	2.0
	Reinsertion of Components	3	0.3
Resurfacing Hip System	Femoral Component Only	51	4.3
	Acetabular Component Only	11	0.9
	Femoral and Acetabular	7	0.6
	Cement Spacer	1	0.1
Thrust Plate	Femoral Component Only	1	0.1
	Acetabular Component Only	1	0.1
Total		**1196**	**100.0**

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

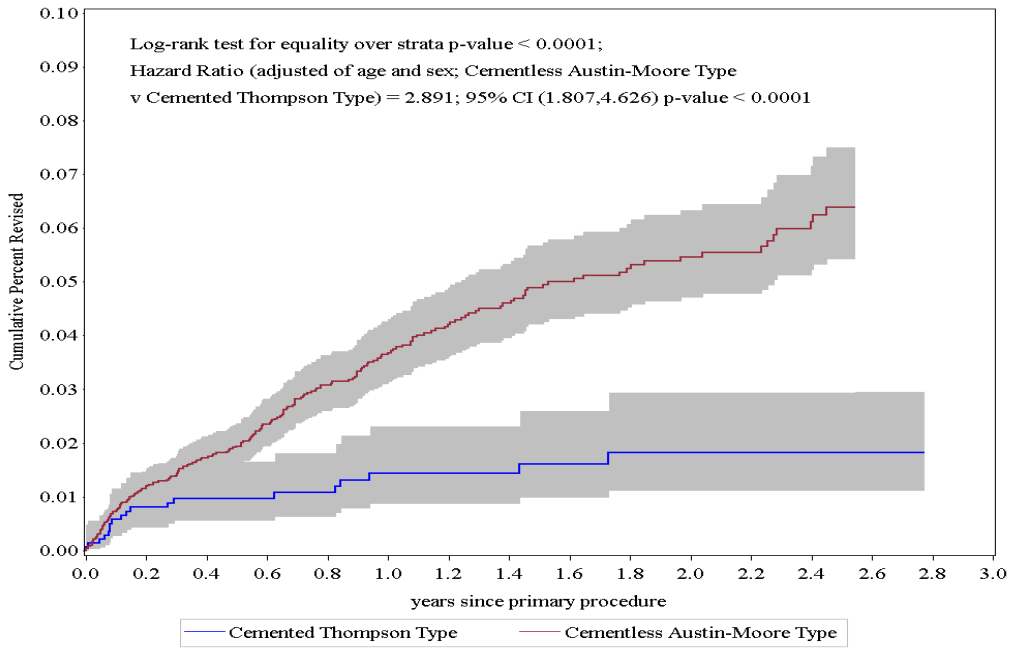
Components used in the Primary Procedures that were Revised

Table H46: 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 Cementless	207	5941	3.5	6717	3.1	(2.68, 3.53)
Austin-Moore Type Cemented	1	95	1.1	85	1.2	(0.03, 6.53)
Thompson Type Cementless	7	181	3.9	217	3.2	(1.30, 6.65)
Thompson Type Cemented	19	1462	1.3	1848	1.0	(0.62, 1.61)
Total	**234**	**7679**[†]	**3.0**	**8867**	**2.6**	**(2.31, 3.00)**

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

Figure H4: 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*
Cemented Thompson type	1462	1024	753	531	357	214	108
Cementless Austin Moore type	5941	3981	2714	1840	1146	624	275

Table H47: 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 SL	Unipolar Head *(Sulzer)*	4	128	3.1	119	3.4	(0.92, 8.61)
CCA	Hemi Head *(Mathys)*	3	165	1.8	283	1.1	(0.22, 3.10)
CPT	Unipolar Type *(Zimmer)*	3	138	2.2	243	1.2	(0.25, 3.61)
CPT	VerSys Endo	0	51	0.0	18	0.0	(0.00, 20.83)
Elite Plus	Hemi Head *(Depuy)*	0	55	0.0	36	0.0	(0.00, 10.24)
Exeter	Unitrax	4	330	1.2	296	1.3	(0.37, 3.45)
Fullfix Stem	Hemi Head *(Mathys)*	1	83	1.2	64	1.6	(0.04, 8.68)
Spectron EF	Unipolar Head *(S&N)*	5	209	2.4	256	2.0	(0.63, 4.56)
Thompson Modular	Ultima	1	117	0.9	204	0.5	(0.01, 2.73)
Others (28)	-	2	248	0.8	246	0.8	(0.10, 2.94)
Total		**23**	**1524**	**1.5**	**1765**	**1.3**	**(0.83, 1.95)**

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

Table H48: Primary Bipolar Procedures requiring Revision

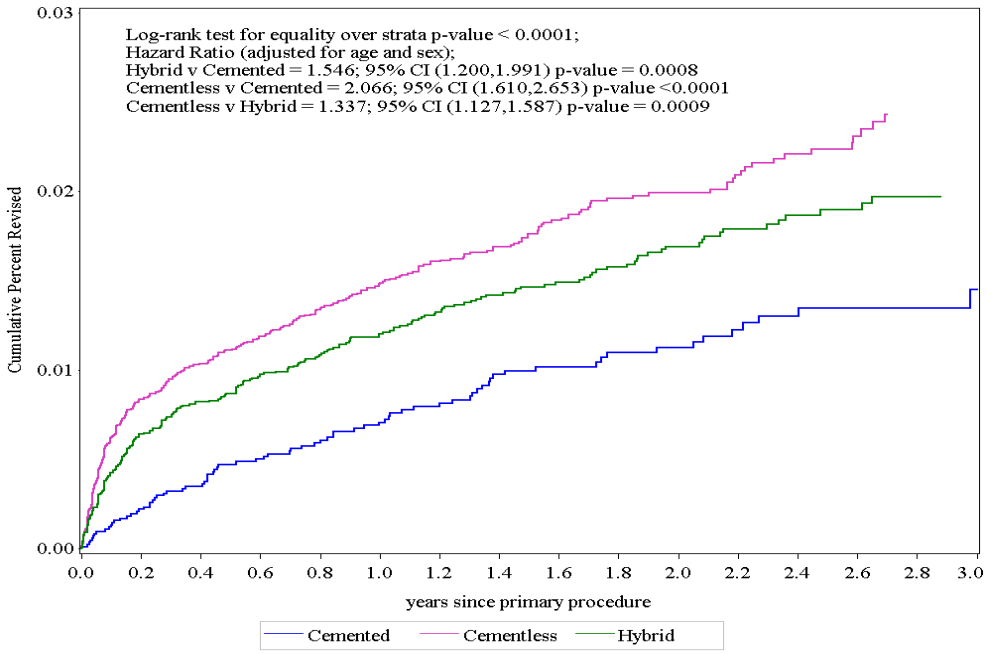
Femoral Component	*Bipolar*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
ABGII	UHR	2	50	4.0	43	4.6	(0.56, 16.63)
Alloclassic	Bipolar Ballhead *(Sulzer)*	0	55	0.0	26	0.0	(0.00, 13.92)
Alloclassic SL	Bipolar Ballhead *(Sulzer)*	3	68	4.4	81	3.7	(0.76, 10.81)
C-Stem	Hastings	2	98	2.0	134	1.5	(0.18, 5.39)
CCA	Bipolar Head *(Mathys)*	1	55	1.8	61	1.6	(0.04, 9.06)
CPCS	Convene	0	88	0.0	57	0.0	(0.00, 6.49)
Elite Plus	Endo Cup *(Depuy)*	0	120	0.0	122	0.0	(0.00, 3.02)
	Hastings	4	214	1.9	327	1.2	(0.33, 3.13)
Exeter	Centrax	5	265	1.9	594	0.8	(0.27, 1.96)
	UHR	18	1349	1.3	1401	1.3	(0.76, 2.03)
Omnifit	UHR	9	204	4.4	289	3.1	(1.42, 5.92)
Spectron EF	Convene	2	132	1.5	178	1.1	(0.14, 4.05)
Others (94)	-	25	700	3.6	746	3.4	(2.17, 4.95)
Total		**71**	**3398**[†]	**2.1**	**4061**	**1.7**	**(1.37, 2.21)**

Note: *femoral model name not repeated but usage continues down the column until change of model name,*
[†]total number equals total primary bipolar procedures

Table H49: Primary Total Procedures for Osteoarthritis requiring revision by cement status excluding infection

Form Cement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Cemented	80	8367	1.0	13974	0.6	(0.45,0.71)
Cementless	361	22225	1.6	30673	1.2	(1.06,1.30)
Hybrid	239	17259	1.4	26201	0.9	(0.80,1.04)
Total	**680**	**47851**	**1.4**	**70848**	**1.0**	**(0.89,1.03)**

Figure H5: 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*
Cementless	22225	17564	13197	9305	5761	3049	1316
Cemented	8367	7100	5751	4458	3163	1979	959
Hybrid	17259	14174	11054	8197	5425	3180	1436

Table H50: Primary 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	6	200	3.0	376	1.6	(0.59, 3.47)
	Charnley Ogee	2	136	1.5	197	1.0	(0.12, 3.67)
	Elite Plus LPW	0	212	0.0	214	0.0	(0.00, 1.72)
	Elite Plus Ogee	0	136	0.0	201	0.0	(0.00, 1.83)
CPCS	Reflection	3	160	1.9	134	2.2	(0.46, 6.55)
CPT	ZCA	2	274	0.7	497	0.4	(0.05, 1.45)
Charnley	Charnley	4	275	1.5	469	0.9	(0.23, 2.18)
	Charnley LPW	4	197	2.0	402	1.0	(0.27, 2.55)
	Charnley Ogee	4	375	1.1	633	0.6	(0.17, 1.62)
Elite Plus	Charnley Ogee	2	200	1.0	355	0.6	(0.07, 2.03)
	Elite Plus Ogee	1	111	0.9	230	0.4	(0.01, 2.42)
Exeter	Contemporary	38	2051	1.9	3024	1.3	(0.89, 1.72)
	Elite Plus Ogee	2	175	1.1	300	0.7	(0.08, 2.41)
	Exeter	13	1158	1.1	2123	0.6	(0.33, 1.05)
MS 30	Low Profile Cup	2	437	0.5	877	0.2	(0.03, 0.82)
Omnifit	Contemporary	2	110	1.8	190	1.1	(0.13, 3.79)
	Omnifit	2	107	1.9	311	0.6	(0.08, 2.32)
Spectron EF	Reflection	1	686	0.1	1211	0.1	(0.00, 0.46)
Other (128)	-	17	1392	1.2	2249	0.8	(0.44, 1.21)
Total		**105**	**8392**	**1.3**	**13995**	**0.8**	**(0.61, 0.91)**

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

Table H51: Primary 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	37	1848	2.0	2484	1.5	(1.05, 2.05)
	Option	1	135	0.7	129	0.8	(0.02, 4.31)
	Trident	11	476	2.3	460	2.4	(1.19, 4.28)
Accolade	Trident	6	456	1.3	371	1.6	(0.59, 3.52)
Alloclassic	Allofit	4	188	2.1	81	5.0	(1.35, 12.68)
	Fitmore	0	116	0.0	62	0.0	(0.00, 5.97)
Alloclassic SL	Allofit	8	805	1.0	1176	0.7	(0.29, 1.34)
	Fitmore	4	400	1.0	598	0.7	(0.18, 1.71)
	Mallory-Head	2	100	2.0	147	1.4	(0.16, 4.91)
	Morscher	4	286	1.4	454	0.9	(0.24, 2.25)
CBC Stem	CBF Cup	4	165	2.4	311	1.3	(0.35, 3.30)
CLS	Allofit	4	204	2.0	231	1.7	(0.47, 4.42)
	CLS	1	158	0.6	406	0.2	(0.01, 1.37)
	Fitmore	5	285	1.8	492	1.0	(0.33, 2.37)
Citation	Trident	3	215	1.4	269	1.1	(0.23, 3.26)
	Vitalock	5	399	1.3	666	0.8	(0.24, 1.75)
Corail	Duraloc	5	368	1.4	391	1.3	(0.42, 2.98)
	Option	2	207	1.0	292	0.7	(0.08, 2.47)
	Pinnacle	1	123	0.8	38	2.6	(0.07, 14.73)
Epoch	Trilogy	1	115	0.9	106	0.9	(0.02, 5.26)
F2L Multineck	SPH-Blind	14	456	3.1	608	2.3	(1.26, 3.86)
Mallory-Head	Mallory-Head	14	923	1.5	1792	0.8	(0.43, 1.31)
Margron	Transcend	9	186	4.8	291	3.1	(1.41, 5.87)
Meridian	ABGII	3	116	2.6	161	1.9	(0.39, 5.46)
	Vitalock	3	261	1.1	414	0.7	(0.15, 2.12)
Natural Hip	Allofit	2	109	1.8	165	1.2	(0.15, 4.38)
	Fitmore	6	433	1.4	624	1.0	(0.35, 2.09)
Omnifit	Secur-Fit	16	373	4.3	684	2.3	(1.34, 3.80)
	Trident	12	621	1.9	1014	1.2	(0.61, 2.07)
Primaloc	Duraloc	1	107	0.9	127	0.8	(0.02, 4.38)
S-Rom	Duraloc	3	122	2.5	248	1.2	(0.25, 3.53)
	Option	3	445	0.7	662	0.5	(0.09, 1.32)
	Pinnacle	1	170	0.6	95	1.1	(0.03, 5.89)
	S-Rom	2	153	1.3	315	0.6	(0.08, 2.29)
Secur-Fit	Secur-Fit	1	113	0.9	238	0.4	(0.01, 2.34)
	Trident	22	1160	1.9	1586	1.4	(0.87, 2.10)
Secur-Fit Plus	Secur-Fit	6	128	4.7	193	3.1	(1.14, 6.76)
	Trident	20	1641	1.2	2276	0.9	(0.54, 1.36)
Stability	Duraloc	4	322	1.2	504	0.8	(0.22, 2.03)
Summit	Option	3	116	2.6	99	3.0	(0.62, 8.83)
	Pinnacle	3	188	1.6	101	3.0	(0.61, 8.71)
Synergy	Reflection	43	2137	2.0	2656	1.6	(1.17, 2.18)
Taperloc	Mallory-Head	6	301	2.0	437	1.4	(0.50, 2.99)
VerSys	Trilogy	29	1502	1.9	1793	1.6	(1.08, 2.32)
Other (281)	-	67	3133	2.1	4452	1.5	(1.17, 1.91)
Total		**401**	**22265**	**1.8**	**30698**	**1.3**	**(1.18, 1.44)**

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

Table H52: Hybrid - Primary Total Hip where the Femoral component was Cemented and the Acetabular component was Cementless requiring Revision

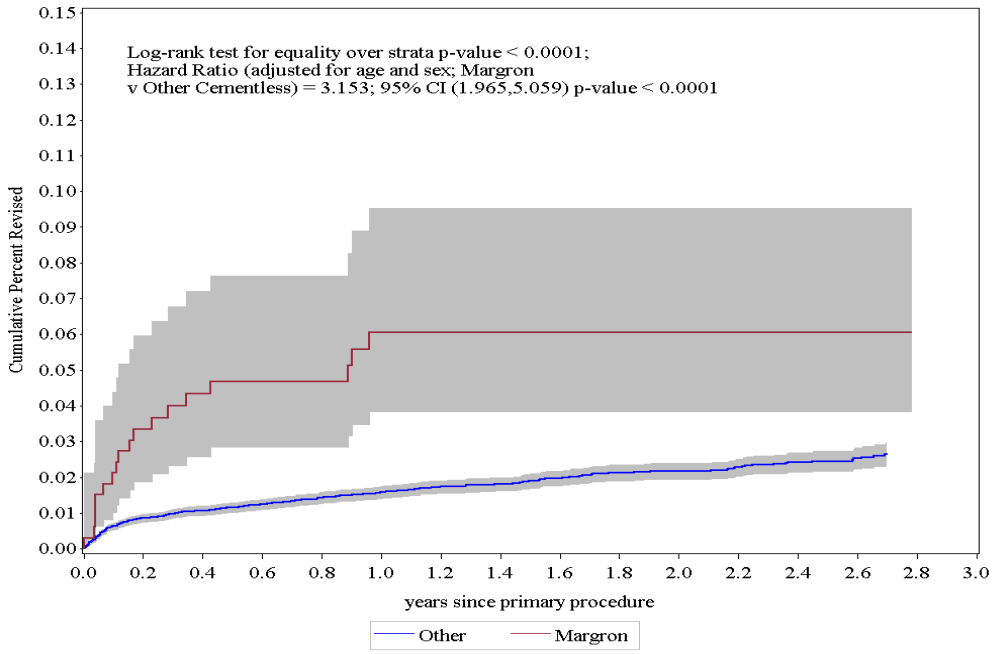
Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
C-Stem	Duraloc	12	486	2.5	676	1.8	(0.92, 3.10)
CPCS	Reflection	1	278	0.4	285	0.4	(0.01, 1.95)
CPT	Trilogy	20	1099	1.8	1532	1.3	(0.80, 2.02)
Charnley	Duraloc	1	140	0.7	245	0.4	(0.01, 2.27)
	Vitalock	8	313	2.6	566	1.4	(0.61, 2.78)
Definition	Trident	3	124	2.4	249	1.2	(0.25, 3.53)
	Vitalock	1	341	0.3	815	0.1	(0.00, 0.68)
Elite Plus	Duraloc	20	883	2.3	1585	1.3	(0.77, 1.95)
	Mallory-Head	2	125	1.6	251	0.8	(0.10, 2.88)
	Trident	2	140	1.4	180	1.1	(0.13, 4.01)
Exeter	ABGII	9	841	1.1	1265	0.7	(0.33, 1.35)
	Duraloc	4	246	1.6	418	1.0	(0.26, 2.45)
	Mallory-Head	5	618	0.8	899	0.6	(0.18, 1.30)
	Reflection	5	140	3.6	188	2.7	(0.86, 6.19)
	Secur-Fit	5	181	2.8	332	1.5	(0.49, 3.51)
	Trident	44	2842	1.5	2859	1.5	(1.12, 2.07)
	Trilogy	2	132	1.5	139	1.4	(0.17, 5.21)
	Vitalock	38	2461	1.5	4623	0.8	(0.58, 1.13)
Freeman	Mallory-Head	6	243	2.5	471	1.3	(0.47, 2.77)
Lubinus SP II	C.F.P.	1	137	0.7	152	0.7	(0.02, 3.66)
MS 30	Allofit	2	326	0.6	374	0.5	(0.06, 1.93)
	Fitmore	0	260	0.0	527	0.0	(0.00, 0.70)
Omnifit	Secur-Fit	4	243	1.6	541	0.7	(0.20, 1.89)
	Trident	19	725	2.6	1064	1.8	(1.08, 2.79)
Spectron EF	Reflection	36	1694	2.1	2701	1.3	(0.93, 1.85)
VerSys	Trilogy	3	373	0.8	543	0.6	(0.11, 1.61)
Other (172)	-	34	1760	1.9	2530	1.3	(0.93, 1.88)
Total		**287**	**17151**	**1.7**	**26012**	**1.1**	**(0.98, 1.24)**

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

Table H53: Hybrid - Primary Total Hip where the Femoral component was Cementless and the Acetabular was Cemented requiring Revision

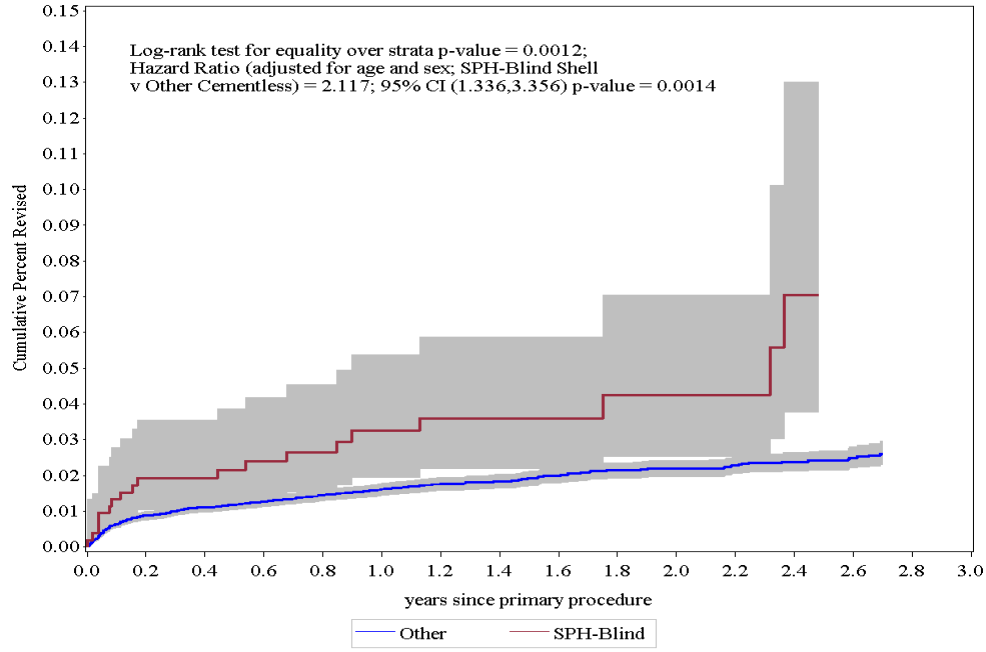
Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Other (89)	-	3	159	1.9	225	1.3	(0.27, 3.89)
Total		**3**	**159**	**1.9**	**225**	**1.3**	**(0.27, 3.89)**

Figure H6: Cumulative percentage of Revision of Margron Hip Prostheses and Other



	Number at risk at start of the period						
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3***
Others	21934	17318	13009	9191	5689	2998	1292
Margron	331	266	197	119	73	51	24

Figure H7: Cumulative percentage of Revision of SPH-Blind Hip Prostheses and Other



	Number at risk at start of the period						
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3***
Others	21734	17161	12906	9116	5655	2999	1294
SPH-Blind	530	422	299	193	107	50	22

Table H54: 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	0	43	0.0	9	0.0	(0.00, 42.64)
BHR	BHR	61	3425	1.8	4445	1.4	(1.05, 1.76)
Conserve		2	2	100.0	3	74.1	(8.97, 267.6)
Conserve Plus	Conserve Plus	0	15	0.0	22	0.0	(0.00, 16.83)
Cormet 2000	Cormet 2000	6	160	3.8	175	3.4	(1.26, 7.45)
Metasul RS	Metasul RS	1	58	1.7	12	8.3	(0.21, 46.08)
Total		**70**	**3703**	**1.9**	**4666**	**1.5**	**(1.17, 1.90)**

Table H55: Femoral Head Size for Primary Total Hip for Osteoarthritis and Revision for Dislocation

Primary Head Size	*Primary*		*Revisions*		*Revisions due to Dislocation*			*Revisions not due to Dislocation*	
	N	*%*	*N*	*%**	*N*	*%†*	*%‡*	*N*	*%††*
To be determined	24	0.1	3	12.50	1	33.3	4.17	2	8.33
22 MM	2399	5.7	44	1.83	18	40.9	0.75	26	1.08
26 MM	6333	15.0	110	1.74	67	60.9	1.06	43	0.68
28 MM	26324	62.5	407	1.55	155	38.1	0.59	252	0.96
>= 30 MM	7032	16.7	90	1.28	28	31.1	0.40	62	0.88
Total	**42112**	**100.0**	**654**	**1.55**	**269**	**41.1**	**0.64**	**385**	**0.91**

Test for trend (revisions due to dislocation) P<0.0001
Test for trend (revisions NOT due to dislocation) P=0.7630

Note: **equals percent of primary procedures revised, †equals percent of revisions, ‡ equals percent of primary procedures revised due to dislocation, †† equals percent of primary procedures revised not due to dislocation*

Table H56: Acetabular Cement for Primary Total Hip for Osteoarthritis and Revision for Dislocation

Primary Head Size	*Primary*		*Revisions*		*Revisions due to Dislocation*			*Revisions not due to Dislocation*	
	N	*%*	*N*	*%**	*N*	*%†*	*%‡*	*N*	*%††*
Cementless	34882	82.8	561	1.61	232	41.4	0.67	329	0.94
Cemented	7230	17.2	93	1.29	37	39.8	0.51	56	0.77
Total	**42112**	**100.0**	**654**	**1.55**	**269**	**41.1**	**0.64**	**385**	**0.91**

** RR (cementless v Cemented adjusted for age and sex and head size) = 1.68 (1.16,2.41) p=0.0056

Note: **equals percent of primary procedures revised, †equals percent of revisions, ‡ equals percent of primary procedures revised due to dislocation, †† equals percent of primary procedures revised not due to dislocation*

AOA National Joint Replacement Registry
Knee Replacement Data

The data presented in this report are for the period 1/09/1999-31/12/2003 and involved the analysis of just over 76,000 knee procedures. This is an additional 28,500 procedures compared to last year's annual report.

Demographics

The demographics remain largely unchanged from the 2003 Report. A new procedure, the unispacer, has been added to the procedure list this year but only a few were reported to the Registry by the end of 2003. A small reduction in the proportion of revision operations has been observed. It has decreased from 8.9% in 2003 to 8.6% this year. The proportion of new revisions notified to the Registry during 2003 was 8.2% of all knee procedures (Table K1).

Gender and age distribution for the different knee procedures remains similar to that previously reported (Tables K2-K6). This is also the situation for procedure specific diagnoses (Tables K7-K10). With each subsequent annual report this is likely to remain the same, as each year new data added will be a decreasing proportion of total Registry data. As time progresses however the Registry will be able to compare year-to-year results thereby identifying changes and trends in practice. During the year we have undertaken a number of analyses to determine if there were any trends evident at this stage. The interpretation of this information has been associated with some short-term limitations, which are a consequence of the staged, state-by-state introduction of the Registry between September 1999 and mid 2002. Since implementation of the Registry was completed in 2002, 2003 was the first year that full national data have been obtained. Previous years' data collection as reported from 2000 onwards has been an increasing proportion of national data but the proportion of individual state data has also varied due to a rolling state-by-state implementation. The effect of this is that when examining for trends or changes in practice at this stage it is necessary to consider if those changes are more an indication of regional variation rather than a true difference at a national level. Despite this limitation there does appear to be a trend to an increasing use of primary total knee replacement in a younger population with the proportion of under 65s steadily increasing from 25.4% in 2000 to 29.5% in 2003 (data not shown). In 2003, 7.1% of primary total knee replacements were in patients aged less that 55.

Prosthesis Usage and Fixation for Primary Knee Replacement

The number of different types of prostheses used for knee replacement surgery continues to increase. In addition to the introduction of the unispacer to the Australian market there have been a number of other new prostheses in each of the knee replacement categories. Three additional types of patellar/trochlear replacement, two new unicompartmental knees and five new total knees (3 cementless and 2 cemented) were reported in 2003 (Tables K11, K13, K15 and K16).

There has been no change in the method of fixation of unicompartmental knee replacements with over 90% being cemented (Table K12). The Registry now has information on sixteen different unicompartmental prostheses. The most common is the Oxford 3, accounting for 40% of all Registry recorded procedures (Table K13).

There has been a slight increase in the use of entirely cementless primary total knee replacement and this method of fixation now accounts for 23.7% of all knees. Cement however remains the principal method of fixation for primary total knee replacement. Both components are cemented in 47.8% and the tibial component either alone or in combination with the femoral component in 75.6% of the

procedures (Table K14). The use of a patella component during total knee replacement has increased slightly but the majority of primary total knee replacements are being undertaken without patella replacement (57.6%) (Table K14). The LCS, Duracon, Genesis II, Nexgen, Scorpio and PFC Sigma are the most common knee prostheses and these six together are used in almost 70% of primary total knee replacements undertaken in this country (Table K19).

Prosthesis Usage and Fixation for Revision Knee Replacement

This report details the analysis of 6,564 knee revisions recorded to the end of 2003. Most of these (73%) have been undertaken on knee replacements (both primary and prior revision) that have been performed before the Registry commenced data collection. The proportion of revisions where the details of the previous surgery, including prosthesis information, that remain unknown to the Registry will steadily decrease with time and eventually reach zero. The focus of this section of the report is to detail the type of revision performed, the prostheses used and the method of bone fixation. Outcomes of these procedures will be established by analysis of any subsequent revisions that are undertaken.

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 combined (see Table K21 for a full list).

The majority (66.2%) of revision procedures are major revisions. This is slightly higher than reported last year. The most common major revision involves replacement of both the femoral and tibial components (70.7%). When this occurs a patellar component is also used in just under half of the procedures (Table K20). The most common minor revision is an insert exchange (39.5%) and this is combined with a patella replacement in a further 28.1% of cases (Table K21). These are all similar to figures reported last year.

The use of cementless fixation in major revisions is unusual. When the tibial component only is revised it is cemented 96.7% of the time (Table K22). If femoral and tibial components are revised together then both are cemented on 80.1% of occasions, the tibial component 90% and the femoral component 84.7% (Table K22).

When a unicompartmental knee replacement is revised with another unicompartmental component, then it is the tibial component only that is revised in just over half of the procedures. Both components are revised on 20.2% of occasions and the femoral component only in the remainder of procedures (Table K23). As the Registry is unaware of the prostheses being revised for the majority of these procedures it remains uncertain as to what proportion of unicompartmental revisions are revised to total knees rather than being revised using a unicompartmental component. The number of unicompartmental to unicompartmental revisions however is likely to be small. Analysis of known primary to revision procedures (detailed later in this report, see primary outcomes section) indicates that conversion to a total knee is the usual mode of revision for a unicompartmental knee that has failed early. Almost 75% of these are revised using a total knee. It is likely that an even greater proportion of unicompartmental knees that fail at a later date will be revised using a total knee replacement.

The number of different types of total knee prosthesis used for major knee revisions where both the femoral and tibial prostheses are replaced has increased to 76 compared to 68 last year (Table K24). The most common types of prostheses used for revision of both the femoral and tibial components have remained similar to that reported last year. This is the same for revisions involving only the tibial component but there has been a change

when the femoral component alone has been revised. In this situation the Genesis II is being used more commonly (Tables K24-K26). It has increased from 4.3% in 2003 to 14.6% this year (Table K26).

The details of minor revisions of total knee replacements have also not changed substantially from those reported in 2003. Patella only revisions account for 9.4% of all revisions and patella combined with tibial insert a further 9.5% (Tables K27-K30). There is only one option for a minor revision of a unicompartmental knee and that is replacement of the tibial insert. This option is not available however for those designs where the tibial insert is moulded to the tray. This needs to be considered when interpreting the significance of the small number of minor revisions within this category of knee replacement (Table K31).

Insert Mobility and Intrinsic Stability of Primary and Revision Knee Replacements

This section of the report presents information on knee prostheses classified according to the specific features of mobility of the insert as well as the intrinsic stability of the knee replacement. In broad terms the insert can be defined as being either fixed or mobile with respect to the tibial tray. A fixed insert is one where there is no intended movement between the insert and the tray. Conversely mobile means that it is intended as part of the prosthesis design for movement to occur between the insert and the tray. The movement may be rotational, sliding or both. Both unicompartmental and total knee replacements may be fixed or mobile. The intrinsic stability of the prosthesis refers to the ability of the prosthesis to substitute for either posterior cruciate or collateral ligament stability. This is a feature that is only relevant to total knees. They have been classified as posterior stabilised, fully stabilised (i.e. able to substitute for collateral ligament instability) or hinged. Those prostheses that do not conform to these stability classifications are regarded as minimally stabilised. This includes flat and dished inserts. The combination of insert mobility and intrinsic stability allows total knees to be classified in a variety of different ways (Table K33). The purpose of this is to establish the pattern of use, monitor changes in use and most importantly, determine the specific outcomes based on these criteria.

The analysis of unicompartmental knee insert mobility demonstrates that the majority of prostheses (56.3%) have fixed inserts. These are either moulded or the insert is fixed in place so that there is no movement intended (Table K32). The remainder of the unicompartmental inserts have been classified as sliding. The combination of insert mobility and intrinsic stability has allowed primary total knees to be classified into 10 groups. The most common is a minimally stabilised fixed insert (59.8%). Posterior stabilised knees are used 14.4% of the time. In the primary setting 10.8% of procedures are posterior stabilised and fixed and 3.5% are posterior stabilised and have rotational movement. Fully stabilised and hinged knees are used rarely as primary total knee replacements (0.4% and 0.2%) (Table K33). There is a difference in the types of prosthesis used for revisions. The majority of knees are still minimally stabilised, however posterior stabilised knees are used 22.4% of the time and fully stabilised and hinged knees 11% and 5.2% (Table K34).

Bilateral Primary Knee Replacement

There are many different potential combinations of bilateral procedures (Table K35). The Registry has recorded 69,485 primary knee procedures that have been performed in 61,102 patients with 8,383 having primary procedures on both knees at sometime during the period the Registry has been collecting data. A same day bilateral procedure has been performed on 35% of these. When bilateral unicompartmental procedures were performed, 53.6% were same day and for bilateral primary total procedures, 32.1% were same day. This equates to 6.7% of all patients who have unicompartmental knees and 3.6% of the patients having primary total knees undergoing a bilateral same day procedure. There is no evidence to suggest that the mortality risk is increased when a

bilateral procedure is undertaken (see mortality section).

Early Outcomes of Primary Total Knee Replacement

The data in this section are based on revisions of primary procedures recorded by the Registry. Revision is the major end point the Registry uses to identify prosthesis failure. As the Registry commenced implementation in 1999 and has only collected full national data since mid 2002, the revisions of known primaries reported here are all early failures. The value of survival analyses for prostheses will increase as both the number of procedures and the time since the primary procedure increases.

In the 2003 Report the Registry analysed 551 revisions of primary knees already recorded in the Registry. This represented 13% of all recorded revisions and was an increase from the 7.5% reported in 2002. This year a further 652 revisions of known primary procedures were reported bringing the total to 1,203 revisions of known primary knee replacements. This is 18.3% of all recorded revisions and the 652 new procedures represent 27.8% of the additional 2,348 revisions reported during 2003. These percentages will increase each year and will eventually reach 100%.

Three different approaches have been used to report revision procedures. The first is the percentage of the total procedures undertaken over the entire time the Registry has recorded data. The second involves reporting the number of revisions arising from the 'risk pool' of components not yet revised. This risk pool is expressed as component years. This measure is a true incidence rate of failure as it takes into account not only whether a revision has occurred but also when. The third approach is the standard survival curve that indicates the proportion of failures over time taking into account those individuals whose prosthesis survival time is unknown i.e. those who have died or whose prosthesis has not been revised at the time of analysis. This is a phenomenon called censoring. The survival curve can also be adjusted for differences due to other factors such as age and gender.

General Comments

There are differences in revision rates depending on the category of knee replacement performed. The incidence of revision for patella/trochlear replacements is 3.0 per 100 observed component years, unicompartmental 2.3 per 100 component year and total knee replacements 1 per 100 per component years (Table K36). There is a significant difference in the age and sex adjusted rate of early revision of unicompartmental knee replacements compared to total knees for osteoarthritis (hazard ratio = 2.0; 95% CI (1.8,2.3), p-value < 0.0001) (Figure K5).

The most common reason for early revision is loosening (33.4%) with infection the next most common at 18.5% (Table K37). The figure of 18.5% does not represent the infection rate for knee replacement surgery but is the proportion of the early revisions undertaken for infection. Overall major revisions were performed on 64.1% of occasions, however this figure varies depending on the type of knee replacement, 69.2% patella/trochlear, 90.8% unicompartmental and 49.5% for total knees (Table K38).

Unispacer

Up to the end of 2003 only a small number of unispacer procedures had been undertaken and no revisions were reported during the period of observation. Analysis of the data currently being collected this year will begin to provide some insight on the performance of this prosthesis. That information will be published in next year's report.

Patellar/Trochlear replacements

Patellar/trochlear replacement is an uncommon knee replacement procedure being responsible for only 0.4% of all knees. The Registry has 331-recorded procedures, 13 of which have been revised (3.9% and 3 per 100 observed component years). There have been seven different trochlear components used, many of which have been used with different patella components and on occasion no patella

component. As a consequence some of the different combinations have very small numbers. There are only three different combinations that have 50 or more observed component years and of these the Avon in combination with the Kinemax Plus patella is the most popular and has the lowest rate of revision (Table K39).

Unicompartmental knee replacement

Unicompartmental knee replacements account for 14.2% of all Registry recorded knee replacements (10,827 of 76,049). Of these, 349 have been revised (3.2% and 2.3 per 100 observed component years) (Table K40). A number of prostheses independent analyses have been undertaken this year including the effect of age and mobility of the tibial insert on the rate of early revision. Both these analyses were done for the single diagnosis of osteoarthritis. Although differences were observed, with younger patients having a higher revision rate, this was not statistically significant for the observed period (data not shown). There was also no significant difference when revision rates for unicompartmental fixed and sliding inserts were compared (data not shown).

The prosthesis specific early revision rates for the eight most commonly used unicompartmental knee replacements are shown in Table K40. Of the sixteen different prostheses used in this category, two have been identified as having early revision rates that are statistically significantly higher than other prostheses. They are the Allegretto and Preservation unicompartmental knees. Previously when the Registry has determined significance the revision rate of a single prosthesis has been compared to the combined rate of the remaining prostheses in that category. As both of the identified prostheses contribute a significant proportion of the total number of procedures the consequence of continuing this approach would have been to compare a single prosthesis to a combined group that contained at least one other prosthesis with a revision rate that was significantly greater than the remaining prostheses within that group. The effect of this, particularly as the prosthesis represents a significant proportion of the combined group, would be to increase the combined revision rate. After much discussion it was decided to compare a single prosthesis to the combined early revision rate of three prostheses known to have the lowest revision rates and which each have more than 1,000 observed component years. The three prostheses are the Repecci, Unix and M/G.

The survival curves for all five prostheses are compared in a single graph. Two things are apparent. The Allegretto and Preservation have a significantly different performance to the other three. The Repecci, Unix and M/G demonstrate similar performance to each other over the defined observation period. (Figure K6).

The increased early revision rate of the Allegretto was first reported by the Registry in the 2002 Report. The Registry now has 1051 Allegretto procedures recorded. This is an increase of 335 compared to pre 2003 reported procedures and represents 8.3% of all new unicompartmental knee replacements reported to the Registry in 2003. In recent years there has been a steady reduction in the proportion of Allegretto unicompartmental knee replacements performed. The level of 17.5% of all unicompartmental knee replacements reported in 2000 has now reduced to 8.3% in 2003. In 2003 the number of recorded revisions has increased from 28 to 53. This is an increase from 3.9% to 5.0% of all Allegretto knee replacements. The revisions per 100 observed component years, however has declined from 3.7 to 3.3. The survival curve indicates that the proportion revised at 12 months is 3.7% and at two years is 7.4%. The early revision rate of this prosthesis is significantly greater than the comparison unicompartmental knee replacements (Allegretto v Other Uni (M/G, Unix, Repecci) hazard ratio = 2.37; 95% CI (1.64, 3.44) p-value < 0.0001)(Figure K7).

The Preservation unicompartmental knee replacement was introduced to the Australian market just over 2.5 years ago. The Registry recorded 443 additional procedures undertaken during 2003 using this prosthesis. This is a significant

proportion of the unicompartmental procedures undertaken during that year (12.1%). The analysis of the revision rate of this prosthesis is a little more complex than with the Allegretto in that there are two different tibial components. One has a fixed tibial insert and the other is mobile with a sliding movement. Overall 42/1028 (4.1%) of the Registry recorded primary Preservations have been revised. This is significantly different when compared to the combined revision rate of the three comparison unicompartmental replacements. (Preservation Fixed/Sliding v Other Uni (M/G, Unix, Repecci) hazard ratio = 2.8; 95% CI (1.87, 4.2) p-value < 0.0001) (Figure K8). The revision rate varies depending on the movement of the tibial component (25/743 (3.4%) fixed and 17/285 (6.0%) sliding). Overall there were 4 revisions per 100 observed component years (3.3 fixed and 5.9 sliding) (Table K41). Despite the apparent increased revision rate of the sliding tibial component there is no statistically significant difference when compared to the fixed (Figure K9). Both Preservation prostheses have a significantly higher rate of revision when each are compared separately to the comparison prostheses (Preservation Fixed v Other Uni (M/G, Unix, Repecci) hazard ratio = 2.4; 95% CI (1.49, 3.86) p-value = 0.0003. and Preservation Sliding v Other Uni (M/G, Unix, Repecci), hazard ratio = 4.2; 95% CI (2.39, 7.63) p-value < 0.0001). The revision diagnosis was reported to be loosening in 71.4% of cases. Additional analysis comparing results from different hospitals was also undertaken. This was to determine if revision rates varied between hospitals. In general hospitals performing the most procedures had a higher incidence of revision (data not shown). The final analysis undertaken was to attempt to determine if there was any evidence to indicate that risk of revision was related to whether the prosthesis was used on either the medial or lateral side. The Registry has only a small number (16) of Preservation unicompartmental knees clearly identified as being used on the lateral side. None of these prostheses has been revised during the observation period.

The results have been discussed with DePuy and the Company made the following comments. "The Preservation has been used particularly in minimally invasive surgery and it is the only mobile bearing unicompartmental knee recommended for use on the lateral side. DePuy acknowledges the findings of the AOA NJRR and will be communicating the high revision rate to current users and seeking their support in providing additional data in order to understand the finding of a higher than anticipated revision rate and address this issue. In recent research by Mr. David Barrett of the School of Engineering Southampton University significant improvements in cementing technique have been identified and are being communicated to Preservation users. The company has also identified that a critical issue for mobile bearing Preservation is medial/lateral mismatch of tibial to femoral component positioning and is in the process of defining this issue to communicate with surgeons. They also noted that the experience of the surgeon which is known to be directly related to outcome particularly for more complex prostheses (Robertsson et. al. JBJS 2001; 83B: 45-49) may have had an effect on the revision rate as 20% of the Australian surgeons were first time users and the company is conducting a full review of training and support procedures".

Total knee replacement

Primary total knee replacements account for 76.7% of all Registry recorded knee replacements (58,314 of 76,049). Of these, 841 have been revised (1.4% and 1 per 100 observed component years) (Table K36). A number of prostheses independent analyses have been undertaken this year examining the effects of age, intrinsic stability of the prosthesis, mobility of the tibial insert, and the method of fixation of the tibial component on early revision. As with the unicompartmental knees there was an increase in the rate of early revision for younger individuals with a total knee replacement but this was not statistically significant (data not shown). There was also no statistically significant difference in early revision rates when comparing fixed and mobile tibial inserts (Table K42) or

minimally and posterior stabilised knees (Table K43). Two specific types of mobile bearing total knee replacements have however been identified as having higher than anticipated early revision rates (see below). The fixation of the tibial component (cemented v cementless) also does not affect the early revision rate (data not shown).

The prosthesis specific early revision rates for all primary total prostheses have been determined with the individual percentage revision rates and rate per 100 observed component years presented for knees with greater than 500 observed component years in Table K44. The two prostheses with statistically higher revision rates compared to other primary total knee replacements are the Genesis II/Mobile Bearing and the Profix/Mobile Bearing. Both are commonly used femoral components that are most often used with a fixed tibial component but have the option of a mobile bearing tibial component. The early revision rate for both of these knee replacements when used with a fixed tibial insert is similar to other knees (Genesis II 1.0 per 100 component observed years, Profix 1.4 per 100 observed component years). The mobile bearing component for both of these has a higher early revision rate than the fixed component and this is statistically significant. The hazard ratio for the Genesis II Mobile Bearing component compared to the Genesis II fixed component is 2.574, 95% CI (1.748, 3.790) p-value < 0.0001. The hazard ratio for the Profix Mobile Bearing component compared to the Profix fixed component is 1.997, 95% CI (1.132, 3.523) p-value = 0.0169 (Figures K10 & K11). Unfortunately unlike a number of other prostheses with higher than anticipated early revision rates identified elsewhere in this report the Registry was unable to give the relevant companies an opportunity to comment on the results. This was due to the higher revision rates for these two prostheses being identified late in the report preparation and as a consequence of having insufficient time to obtain the responses prior to publication.

Registry Recorded Revision to Revision Knee Replacements

The Registry has now recorded 535 revision knee replacements that have undergone subsequent revision. As was reported, last year approximately 50% are for infection and rather than being an unexpected revision the subsequent revision is often the second stage of a planned two stage procedure (Table K45). The effect of this is that there are only small numbers of unexpected subsequent revisions of revision procedures. These numbers remain insufficient to undertake any meaningful analysis of outcomes related to revision surgery. The situation is further complicated when considering the number of patients having re-revisions. There are an increasing number of patients having multiple revision procedures on the same joint with 450 patients having more than one revision on the same joint and a small but increasing number who have had more than two revisions (Table K46).

The ability to undertake analysis in a manner similar to that performed for primary knee replacements will be enhanced as the number of re-revision procedures increases. It is anticipated that the Registry will commence this analysis in the next report.

Knee Replacement - 1/9/1999 to 31/12/2003

Table K1: Number of Knee Replacements by sex

Type of knee replacement	*Female*		*Male*		*Total*	
	Number	*%*	*Number*	*%**	*Number*	*%*
Unispacer	7	0.0	6	0.0	13	0.0
Patellar/trochlear	252	0.3	79	0.1	331	0.4
Unicompartmental Knee	5192	6.8	5635	7.4	10827	14.2
Primary Total Knee	33161	43.6	25153	33.1	58314	76.7
Revision Knee	3455	4.5	3109	4.1	6564	8.6
Total	**42067**	**55.3**	**33982**	**44.7**	**76049**	**100.0**

Note: *percents shown are out of 76049*
In some tables entries may not sum to totals due to rounding.

Definitions

Unispacer *medial or lateral unicompartmental articular spacer*
Patellar/trochlear: *patellar/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*

Demographic characteristics of patients undergoing Knee Replacement

1/9/1999 to 31/12/2003

Table K2: Summary statistics of age (by sex) for All Knee Replacements

	Female *N=42067 (55.3%)*	***Male*** *N=33982 (44.7%)*	***All Patients*** *N= 76049 (100.0%)*
Median	71	70	70
Minimum	13	12	12
Maximum	102	99	102
Mean	69.3	68.6	69.0
Standard Deviation	9.8	9.6	9.7

Table K3: Summary statistics of age (by sex) for Patellar/trochlear Replacement

	Female *N=252 (76.1%)*	***Male*** *N=79 (23.9%)*	***All Patients*** *N=331 (100.0%)*
Median	57	54	56
Minimum	29	33	29
Maximum	92	87	92
Mean	58.0	56.1	57.5
Standard Deviation	12.4	12.8	12.5

Figure K1: Age and Sex - Patellar/trochlear Knee Replacement

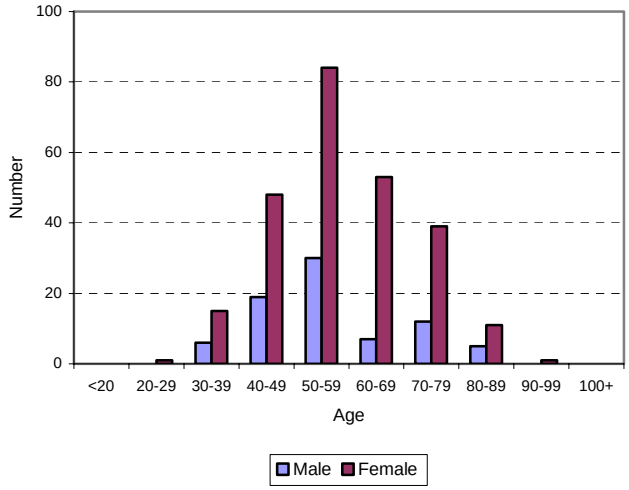


Table K4: Summary statistics of age (by sex) for Unicompartmental Knee Replacement

	Female *N=5192 (48.0%)*	***Male*** *N=5635 (52.0%)*	***All Patients*** *N=10827 (100.0%)*
Median	66	66	66
Minimum	25	31	25
Maximum	95	97	97
Mean	65.6	66.2	65.9
Standard Deviation	10.3	9.6	9.9

Figure K2: Age and Sex - Unicompartmental Knee Replacement

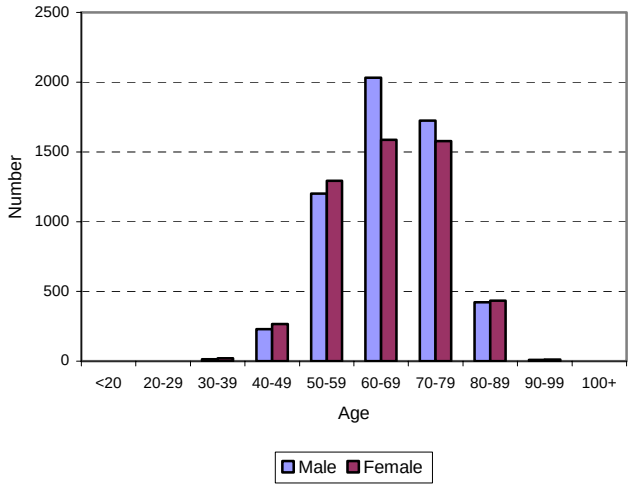


Table K5: Summary statistics of age (by sex) for Primary Total Knee Replacement

	Female *N=33161 (56.9%)*	***Male*** *N=25153 (43.1%)*	***All Patients*** *N=58314 (100.0%)*
Median	71	70	71
Minimum	13	12	12
Maximum	102	99	102
Mean	69.9	69.0	69.5
Standard Deviation	9.5	9.3	9.4

Figure K3: Age and Sex - Primary Total Knee Replacement

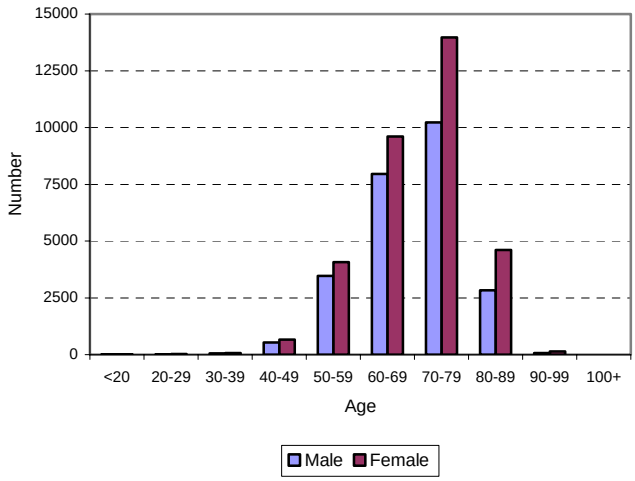


Table K6: Summary statistics of age (by sex) for Revision Knee Replacement

	Female *N*=3455 *(52.6%)*	***Male*** *N*=3109 *(47.4%)*	***All Patients*** *N*=6564 *(100.0%)*
Median	72	72	72
Minimum	17	16	16
Maximum	94	93	94
Mean	70.3	70.2	70.2
Standard Deviation	10.3	10.3	10.3

Figure K4: Age and Sex - Revision Total Knee Replacement

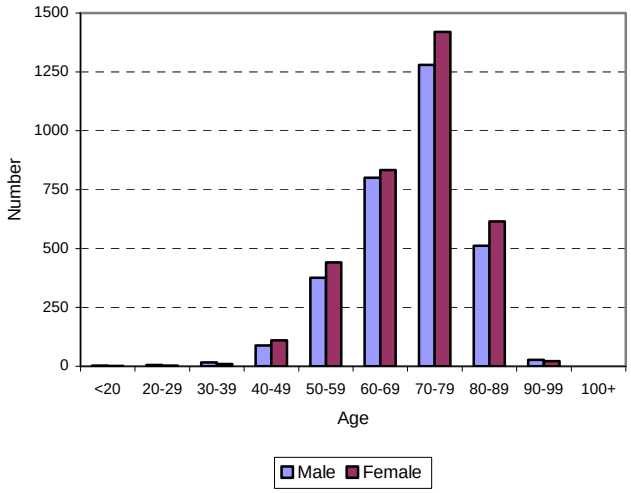


Table K7: Principal Diagnosis - Patella/trochlear Replacement

Diagnosis	*Number*	*%*
Osteoarthritis	327	98.8
Other Inflammatory Arthritis	4	1.2
Total	**331**	**100.0**

Table K8: Principal Diagnoses - Unicompartmental Knee Replacement

Diagnosis	*Number*	*%**
Osteoarthritis	10677	98.6
Avascular Necrosis	95	0.9
Rheumatoid Arthritis	35	0.3
Other Inflammatory Arthritis	15	0.1
Tumour	4	0.0
Other	1	0.0
Total	**10827**	**100.0**

Table K9: Principal Diagnosis - Primary Total Knee Replacement

Diagnosis	*Number*	*%*
Osteoarthritis	56077	96.2
Rheumatoid Arthritis	1509	2.6
Other Inflammatory Arthritis	359	0.6
Avascular Necrosis	259	0.4
Tumour	71	0.1
Other	39	0.1
Total	**58314**	**100.0**

Table K10: Diagnosis - Revision Knee Replacement

Diagnosis	*Number*	*%*
Loosening	2849	37.7
Infection	999	13.2
Wear Tibial	752	9.9
Lysis	583	7.7
Pain	420	5.6
Patello-Femoral Pain	418	5.5
Implant Breakage Tibial	232	3.1
Instability	205	2.7
Fracture	169	2.2
Progression Of Disease	135	1.8
Implant Breakage Patella	125	1.7
Wear Patella	111	1.5
Arthrofibrosis	102	1.3
Malalignment	67	0.9
Implant Breakage Femoral	56	0.7
Synovitis	44	0.6
Bearing/Dislocation	43	0.6
Dislocation	41	0.5
Incorrect Sizing	41	0.5
Patella Maltracking	38	0.5
Avascular Necrosis	11	0.1
Heterotropic Bone	7	0.1
Arthrodesis Takedown	1	0.0
Other	118	1.6
Total	**7567**	**100.0**

Note: *some patients had multiple diagnoses*

Prosthesis Fixation and Usage for Patellar/trochlear Knee Replacement

1/9/1999 to 31/12/2003

Table K11: Prosthesis Usage - Patellar/trochlear Replacement

Patellar/trochlear replacement	*Patella*	*Number*	*%*
Avon	Kinemax Plus	121	36.6
	-	3	0.9
	Nexgen	2	0.6
	Duracon	1	0.3
LCS	LCS	76	23.0
	-	4	1.2
	Nexgen	1	0.3
	Scorpio	1	0.3
Lubinus Patella Glide	Lubinus Patella Glide	30	9.1
	Duracon	27	8.2
MOD III	MOD III	44	13.3
	LCS	4	1.2
	-	1	0.3
	Genesis II	1	0.3
Themis	Themis	12	3.6
	-	1	0.3
Global Custom Made	-	1	0.3
RBK	RBK	1	0.3
Total		**331**	**100.0**

Note: *-some of these patients have had a previous patellectomy*

Prosthesis Fixation and Usage for Unicompartmental Knee Replacement

1/9/1999 to 31/12/2003

Table K12: Prosthesis Fixation - Unicompartmental Knee Replacement

Fixation	*Number*	*%*
Tibial and femoral cementless	883	8.2
Tibial and femoral cemented	9879	91.2
Tibial only cemented	19	0.2
Femoral only cemented	46	0.4
Total	**10827**	**100.0**

Table K13: Prosthesis Usage - Unicompartmental Knee Replacement

Prosthesis used	*Number*	*%*
Oxford 3	4334	40.0
Repecci	1348	12.5
Allegretto Uni Knee	1051	9.7
Preservation	1028	9.5
M/G	965	8.9
Unix	708	6.5
Genesis	478	4.4
GRU	364	3.4
Endo-Model Sled	138	1.3
PFC Sigma	137	1.3
Other (6)	276	2.5
Total	**10827**	**100.0**

Note: *other (n) equals the number of other types of prostheses*

Prosthesis Fixation and Usage for Primary Total Knee Replacement

1/9/1999 to 31/12/2003

Table K14: Prosthesis Fixation - Primary Total Knee Replacement

Fixation	*Total*		*Patella used*			
			Patella cementless		*Patella cemented*	
	Number	*%*	*Number*	*%†*	*Number*	*%†*
Tibial and femoral cementless	13839	23.7	1397	10.1	2945	21.3
Tibial and femoral cemented	27890	47.8	40	0.1	13824	49.6
Tibial only cemented	16201	27.8	205	1.3	6102	37.7
Femoral only cemented	384	0.7	8	2.1	183	47.7
Total	**58314**	**100.0**	**1650**	**2.8**	**23054**	**39.5**

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

Table K15: Prosthesis Usage - Primary Total Knee Replacement where both the Tibial and Femoral components were Cementless

Prosthesis Used	*Total Number*	*%*	*Patella used*	*%†*
LCS	3985	28.8	1329	33.4
Nexgen	2064	14.9	516	25.0
Duracon	1358	9.8	187	13.8
Natural Knee	1090	7.9	552	50.6
Scorpio	1073	7.8	303	28.2
Active Knee	689	5.0	399	57.9
Profix	595	4.3	88	14.8
PFC Sigma	575	4.2	110	19.1
RBK	561	4.1	330	58.8
Genesis II	436	3.2	56	12.8
Other (21)	1413	10.2	472	33.4
Total	**13839**	**100.0**	**4342**	**31.4**

Note: *†percents shown are row percents out of total number*
other (n) equals the number of other types of prostheses

Table K16: Prosthesis Usage - Primary Total Knee Replacement where both the Tibial and Femoral Component were Cemented

Prosthesis Used	*Total Number*	*%*	*Patella used*	*%†*
Genesis II	4309	15.4	2365	54.9
LCS	3712	13.3	1192	32.1
Duracon	3516	12.6	1839	52.3
Nexgen LPS	2260	8.1	1238	54.8
PFC Sigma	2257	8.1	1286	57.0
Nexgen	2162	7.8	855	39.5
Scorpio	1785	6.4	990	55.5
Profix	1417	5.1	561	39.6
AGC	1323	4.7	622	47.0
Kinemax Plus	1140	4.1	985	86.4
Other (43)	4009	14.4	1931	48.2
Total	**27890**	**100.0**	**13864**	**49.7**

Note: *†percents shown are row percents out of total number*
other (n) equals the number of other types of prostheses

Table K17: Prosthesis Usage - Primary Total Knee Replacement where the Tibial component was Cemented and the Femoral component was Cementless

Prosthesis Used	*Total Number*	*%*	*Patella used*	*%†*
Duracon	3509	21.7	1355	38.6
Scorpio	2401	14.8	1340	55.8
LCS	1925	11.9	522	27.1
PFC Sigma	1922	11.9	616	32.0
Nexgen	1535	9.5	690	45.0
Genesis II	1286	7.9	468	36.4
AGC	688	4.2	212	30.8
Natural Knee	656	4.0	352	53.7
Profix	506	3.1	119	23.5
Maxim	374	2.3	100	26.7
Other (32)	1399	8.6	533	38.1
Total	**16201**	**100.0**	**6307**	**38.9**

Note: *†percents shown are row percents out of total number*
other (n) equals the number of other types of prostheses

Table K18: Prosthesis Usage - Primary Total Knee Replacement where the Tibial component was Cementless and the Femoral component was Cemented

Prosthesis Used	*Total Number*	*%**	*Patella used*	*%†*
PFC Sigma	92	24.0	79	85.9
Profix	75	19.5	8	10.7
Duracon	41	10.7	10	24.4
Nexgen	30	7.8	23	76.7
Genesis II	29	7.6	9	31.0
LCS	29	7.6	3	10.3
Maxim	26	6.8	23	88.5
Natural Knee	17	4.4	15	88.2
Scorpio	7	1.8	4	57.1
HMRS	5	1.3	1	20.0
Other (13)	33	8.6	16	48.5
Total	**384**	**100.0**	**191**	**49.7**

Note: *†percents shown are row percents out of total number*
other (n) equals the number of other types of prostheses

Top Ten Knee Prostheses used for Primary Total Knee Replacement

1/9/1999 to 31/12/2003

Table K19: Top Ten Knee Prostheses used in Primary Total Knee Replacements

Femoral Prosthesis	*Number*	*%*
LCS	9651	16.6
Duracon	8424	14.4
Genesis II	6060	10.4
Nexgen	5791	9.9
Scorpio	5266	9.0
PFC Sigma	4846	8.3
Profix	2593	4.4
Nexgen LPS	2458	4.2
Natural Knee	2362	4.1
AGC	2013	3.5
Other (50)	8850	15.2
Total	**58314**	**100.0**

Note: *other (n) equals the number of other types of prostheses*

Table K20: Components Used - Major Revision Knee Replacement

Components Used	*Total*		*Patella used*			
			cementless		*cemented*	
	Number	*%*	*Number*	*%†*	*Number*	*%†*
Tibial And Femoral	3072	70.7	58	1.9	1387	45.1
Tibial Only	645	14.8	18	2.8	151	23.4
Femoral Only	267	6.1	2	0.7	70	26.2
Uni Tibial And Femoral	18	0.4	.	.	.	.
Uni Tibial Only	45	1.0	.	.	.	.
Uni Femoral Only	26	0.6	.	.	.	.
Cement Spacer	192	4.4	.	.	.	.
Removal of Prostheses	52	1.2	.	.	.	.
Fusion Nail	20	0.5	.	.	.	.
Reinsertion of Components	3	0.1	.	.	.	.
Patella/Trochlear Resurfacing	6	0.1	2	33.3	3	50.0
Total	**4346**	**100.0**	**80**	**1.8**	**1611**	**37.1**

Note: ***.*** *equals no patella used*
†percents shown are row percents out of total number

Table K21 Components Used - Minor Revision Knee Replacement

Components Used	*Number*	*%*
Insert Only	877	39.5
Insert And Patella	623	28.1
Patella Only	618	27.9
Uni Insert Only	68	3.1
Cable/ Other Minor Components	24	1.1
Removal of Patella	8	0.4
Total	**2218**	**100.0**

Table K22: 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	2488	57.2	192	4.4	277	6.4	115	2.6	.	.	3072	70.7
Tibial Only	624	14.4	21	0.5	.	.	.	.	.	.	645	14.8
Femoral Only	245	5.6	22	0.5	.	.	.	.	.	.	267	6.1
Uni Tibial and Femoral	17	0.4	1	0.0	.	.	.	.	.	.	18	0.4
Uni Tibial Only	41	0.9	4	0.1	.	.	.	.	.	.	45	1.0
Uni Femoral Only	25	0.6	1	0.0	.	.	.	.	.	.	26	0.6
Cement Spacer	.	.	.	.	.	.	.	.	192	4.4	192	4.4
Removal of Prostheses	.	.	.	.	.	.	.	.	52	1.2	52	1.2
Fusion Nail	.	.	.	.	.	.	.	.	20	0.5	20	0.5
Reinsertion of Components[†]	1	0.0	.	.	1	0.0	1	0.0	.	.	3	0.1
Patella/Trochlear Resurfacing	6	0.1	.	.	.	.	.	.	.	.	6	0.1
Total	**3447**	**79.3**	**241**	**5.5**	**278**	**6.4**	**116**	**2.7**	**264**	**6.1**	**4346**	**100.0**

Note: *N/A means not applicable because a knee component was not used.*
[†]prostheses removed cleaned and reinserted

Table K23: Prosthesis Used - Unicompartmental - Major Revision Knee Replacement

Prosthesis Used	*Uni Tibial Only*	*Uni Femoral Only*	*Uni Tibial & Femoral*	*Total*	
	N	*N*	*N*	*N*	*%*
Oxford 3	10	15	7	32	36.0
Preservation	8	2	1	11	12.4
Allegretto Uni Knee	4	4	2	10	11.2
Genesis	5	.	3	8	9.0
Repecci	3	1	2	6	6.7
PFC Sigma	3	1	1	5	5.6
M/G	3	1	.	4	4.5
Unix	2	1	1	4	4.5
GRU	3	.	1	4	4.5
Endo-Model Sled	3	.	.	3	3.4
Natural Knee	1	1	.	2	2.2
Total	**45**	**26**	**18**	**89**	**100.0**

Table K24: Prosthesis Usage - Major Revision Knee Replacement

Prosthesis Used		*Total*		*Patella used*	
		Number	*%*	*Number*	*%[†]*
Genesis II	*Cemented*	379	12.3	199	52.5
PFC Sigma	*Cemented*	320	10.4	157	49.1
Duracon	*Cemented*	269	8.8	143	53.2
S-Rom	*Cemented*	214	7.0	78	36.4
Profix	*Cemented*	193	6.3	88	45.6
Nexgen LCCK	*Cemented*	188	6.1	76	40.4
LCS	*Cemented*	166	5.4	72	43.4
Scorpio	*Cemented*	151	4.9	87	57.6
Natural Knee	*Cemented*	110	3.6	68	61.8
Nexgen LPS	*Cemented*	95	3.1	54	56.8
Other (66)		987	32.1	423	42.9
Total		**3072**	**100.0**	**1445**	**47.0**

Note: *[†]percents shown are row percents out of total number, other (n) equals the number of other types of prostheses*

Table K25: Prosthesis Usage - Major Revision Knee Replacement where the Tibial component only was replaced

Prosthesis Used		*Total*		*Patella used*	
		Number	*%*	*Number*	*%†*
LCS	*Cemented*	90	14.0	21	23.3
Duracon	*Cemented*	76	11.8	22	28.9
Genesis II	*Cemented*	63	9.8	11	17.5
PFC Sigma	*Cemented*	55	8.5	20	36.4
Natural Knee	*Cemented*	43	6.7	10	23.3
M/G II	*Cemented*	38	5.9	14	36.8
I/B II	*Cemented*	37	5.7	9	24.3
Nexgen	*Cemented*	31	4.8	6	19.4
Kinemax Plus	*Cemented*	28	4.3	4	14.3
Scorpio	*Cemented*	21	3.3	5	23.8
Other (40)		163	25.3	47	28.8
Total		**645**	**100.0**	**169**	**26.2**

Note: *†percents shown are row percents out of total number*
other (n) equals the number of other types of prostheses

Table K26: Components Used - Major Revision Knee Replacement where the Femoral component only was replaced

Prosthesis Used		*Total*		*Patella used*	
		Number	*%*	*Number*	*%†*
Genesis II	*Cemented*	39	14.6	5	12.8
LCS	*Cemented*	31	11.6	10	32.3
PFC Sigma	*Cemented*	24	9.0	12	50.0
Profix	*Cemented*	24	9.0	5	20.8
Duracon	*Cemented*	20	7.5	7	35.0
Scorpio	*Cemented*	9	3.4	2	22.2
Coordinate	*Cemented*	7	2.6	2	28.6
Natural Knee	*Cemented*	7	2.6	2	28.6
Nexgen LCCK	*Cemented*	7	2.6	3	42.9
Kinemax Plus	*Cemented*	6	2.2	3	50.0
Other (37)		93	34.8	21	22.6
Total		**267**	**100.0**	**72**	**27.0**

Note: *†percents shown are row percents out of total number*
other (n) equals the number of other types of prostheses

Table K27: Prosthesis Usage - Minor Revision Knee Replacement where a Patella only was used

Patella Used	*Total*	
	Number	*%*
LCS	107	17.3
Duracon	80	12.9
Genesis II	76	12.3
Nexgen MBK	47	7.6
PFC Sigma	45	7.3
AGC	40	6.5
AMK	24	3.9
Scorpio	23	3.7
I/B II	22	3.6
Natural Knee	21	3.4
Other (21)	133	21.5
Total	**618**	**100.0**

Note: *other (n) equals the number of other types of patellas*

Table K28: Prosthesis Usage - Minor Revision Knee Replacement where an Insert only was used

Insert Used	*Total*	
	Number	*%*
LCS	124	14.1
Duracon	113	12.9
M/G II	66	7.5
Genesis	65	7.4
PFC Sigma	55	6.3
Advantim	50	5.7
M/G	48	5.5
Genesis II	43	4.9
Nexgen	42	4.8
PCA	42	4.8
Other (33)	229	26.1
Total	**877**	**100.0**

Note: *other (n) equals the number of other types of inserts*

Table K29: Prosthesis Usage - Patella used in Minor Revision Knee Replacement where a Patella and an Insert were implanted

Patella Used	*Total*	
	Number	*%*
M/G II	101	16.2
I/B II	83	13.3
Duracon	60	9.6
LCS	47	7.5
PFC Sigma	46	7.4
Nexgen MBK	42	6.7
Advantim	39	6.3
PCA	38	6.1
Genesis II	28	4.5
Genesis	24	3.9
Other (16)	115	18.5
Total	**623**	**100.0**

Note: *other (n) equals the number of other prostheses*

Table K30: Prosthesis Usage - Tibial Inserts used in Minor Revision Knee Replacement where a Patella and an Insert were implanted

Insert Used	*Total*	
	Number	*%*
M/G II	103	16.5
M/G	85	13.6
Duracon	58	9.3
LCS	48	7.7
PFC Sigma	42	6.7
PCA	38	6.1
Genesis	35	5.6
Nexgen	30	4.8
Advantim	26	4.2
AMK	20	3.2
Other (24)	138	22.2
Total	**623**	**100.0**

Note: *other (n) equals the number of other prostheses*

Table K31: Prosthesis Usage - Minor Revision Knee Replacement where a Unicompartmental Insert only was used

Insert Used	*Total*	
	Number	*%*
Oxford 3	45	66.2
M/G	11	16.2
Unix	5	7.4
Oxford 2	5	7.4
Genesis	2	2.9
Total	**68**	**100.0**

Table K32: Movement and Stabilisation - Primary Unicompartmental knees

Movement	*N*	*%*
Fixed	6101	56.3
Sliding	4720	43.6
Unknown	6	0.1
Total	**10827**	**100.0**

Note: *Includes inserts, moulded insert. 6 inserts were unable to be confirmed since the participating hospitals have not been able to provide this information.*

Table K33: Movement and Stabilisation - Primary Total knees

Movement	*Stabilisation*	*N*	*%*
Fixed	Minimal	34849	59.8
	Posterior Stabilised	6308	10.8
	Fully Stabilised	212	0.4
	Hinged	44	0.1
Rotating	Minimal	11686	20.0
	Posterior Stabilised	2042	3.5
	Fully Stabilised	1	0.0
	Hinged	53	0.1
Rotating - Sliding	Minimal	2277	3.9
Sliding	Minimal	811	1.4
Unknown		31	0.1
Total		**58314**	**100.0**

Note: *Includes inserts, moulded inserts, and Total Knee (i.e. LINK Endo-Model Rotational), 31 inserts were unable to be confirmed since the participating hospitals have not been able to provide this information.*

Table K34: Movement and Stabilisation - Revision knees

Movement	*Stabilisation*	*N*	*%*
Fixed	Minimal	2568	47.3
	Posterior Stabilised	954	17.6
	Fully Stabilised	594	10.9
	Hinged	38	0.7
Rotating	Minimal	638	11.8
	Posterior Stabilised	258	4.8
	Fully Stabilised	3	0.1
	Hinged	243	4.5
Sliding	Minimal	56	1.0
Rotating - Sliding	Minimal	52	1.0
To be Determined	Unknown	22	0.5
Total		**5426**	**100.0**

Note: *Includes inserts, moulded inserts, and Total Knee (i.e. LINK Endo-Model Rotational), 22 inserts were unable to be confirmed since the participating hospitals have not been able to provide this information.*

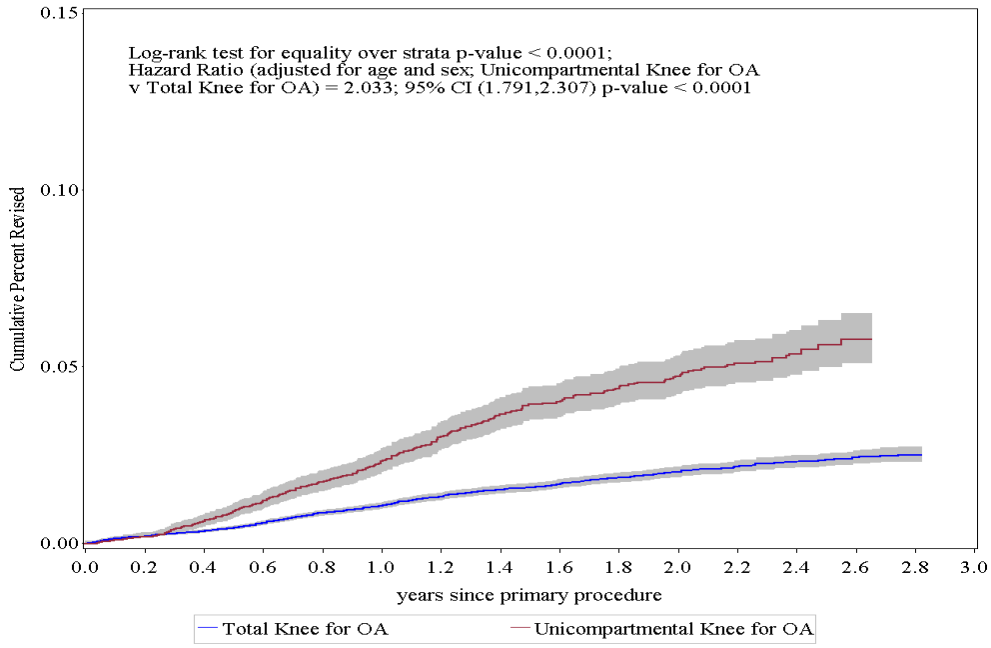
Table K35: Days between procedures for Bilateral Primary Knees

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	31	0.4	.	.	1	0.0	5	0.1	8	0.1	45	0.5
Both Primary Total	2175	25.9	109	1.3	42	0.5	1344	16.0	3108	37.1	6778	80.9
Both Unicompartmental	643	7.7	25	0.3	9	0.1	212	2.5	311	3.7	1200	14.3
Patella/trochlear & Primary Total Knee	1	0.0	.	.	.	.	.	.	3	0.0	4	0.0
Patella/trochlear & Unicompartmental	.	.	.	.	.	.	.	.	1	0.0	1	0.0
Unicompartmental & Primary Total	87	1.0	3	0.0	3	0.0	45	0.5	216	2.6	354	4.2
Unicompartmental & Primary Unispacer	.	.	.	.	.	.	1	0.0	.	.	1	0.0
Total	**2937**	**35.0**	**137**	**1.6**	**55**	**0.7**	**1607**	**19.2**	**3648**	**43.5**	**8383**	**100.0**

Table K36: Revision by Type of Primary Knee Replacement

	Number Revised	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
UniSpacer	0	13	0.0	5	0.0	(0.00, 73.91)
Patella/trochlear	13	331	3.9	433	3.0	(1.60, 5.13)
Unicompartmental	349	10827	3.2	14948	2.3	(2.10, 2.59)
Primary Total	841	58314	1.4	84388	1.0	(0.93, 1.07)

Figure K5: Cumulative percentage of Revision of Unicompartmental Knees for Osteoarthritis and Total Knees for Osteoarthritis



	Number at risk at start of the period						
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*
Total Knee for OA	56077	45365	34387	24976	15739	8695	4053
Unicompartmental Knee for OA	10677	8591	6462	4430	2720	1349	564

Table K37: Days to Revision by Revision Diagnosis

Revision Diagnosis	*Days to revision Procedure*										*Total*	
	Same Day		*<2 Weeks*		*2-6 Weeks*		*6 Weeks – 1 Year*		*>1 Year*			
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Loosening	1	0.1	9	0.7	11	0.9	225	17.6	182	14.2	428	33.4
Infection	.	.	6	0.5	43	3.4	122	9.5	66	5.2	237	18.5
Pain	.	.	1	0.1	1	0.1	55	4.3	62	4.8	119	9.3
Patello-Femoral Pain	.	.	.	.	1	0.1	50	3.9	61	4.8	112	8.8
Instability	.	.	.	.	6	0.5	29	2.3	19	1.5	54	4.2
Fracture	.	.	1	0.1	8	0.6	30	2.3	10	0.8	49	3.8
Arthrofibrosis	.	.	.	.	.	.	18	1.4	19	1.5	37	2.9
Progression of Disease	.	.	.	.	.	.	12	0.9	24	1.9	36	2.8
Malalignment	.	.	2	0.2	2	0.2	11	0.9	12	0.9	27	2.1
Wear Tibial	.	.	.	.	.	.	5	0.4	15	1.2	20	1.6
Bearing/Dislocation	.	.	2	0.2	1	0.1	12	0.9	5	0.4	20	1.6
Lysis	.	.	.	.	.	.	8	0.6	10	0.8	18	1.4
Incorrect Sizing	.	.	2	0.2	.	.	11	0.9	3	0.2	16	1.3
Dislocation	.	.	4	0.3	.	.	8	0.6	3	0.2	15	1.2
Implant Breakage Tibial	.	.	1	0.1	.	.	7	0.5	1	0.1	9	0.7
Avascular Necrosis	.	.	.	.	.	.	6	0.5	2	0.2	8	0.6
Synovitis	.	.	1	0.1	.	.	4	0.3	2	0.2	7	0.5
Implant Breakage Patella	.	.	.	.	.	.	3	0.2	3	0.2	6	0.5
Wear Patella	.	.	.	.	.	.	2	0.2	4	0.3	6	0.5
Implant Breakage Femoral	.	.	.	.	.	.	5	0.4	1	0.1	6	0.5
Patella Maltracking	.	.	.	.	.	.	4	0.3	1	0.1	5	0.4
Other	.	.	6	0.5	3	0.2	18	1.4	18	1.4	45	3.5
Total	**1**	**0.1**	**35**	**2.7**	**76**	**5.9**	**645**	**50.4**	**523**	**40.9**	**1280**	**100**

Note: *some patients had multiple diagnoses*

Table K38: Primary to Revision procedure types

Primary	*Revision*	*Number*	*%*
Patella/trochlear	Tibial and Femoral	8	0.7
	Patella Only	4	0.3
	Patella/Trochlear Resurf	1	0.1
Unicompartmental Knee	Tibial and Femoral	261	21.7
	Femoral Only	1	0.1
	Uni Tibial and Femoral	5	0.4
	Uni Tibial Only	26	2.2
	Uni Femoral Only	16	1.3
	Uni Insert Only	32	2.7
	Cement spacer	3	0.2
	Removal of Prostheses	4	0.3
	Reinsertion of Components	1	0.1
Primary Total Knee	Tibial and Femoral	175	14.5
	Tibial Only	105	8.7
	Femoral Only	87	7.2
	Insert and Patella	69	5.7
	Patella Only	156	13.0
	Insert Only	194	16.1
	Cement spacer	36	3.0
	Removal of Prostheses	12	1.0
	Fusion Nail	1	0.1
	Cable/ Other minor comps	6	0.5
Total		**1203**	**100.0**

Table K39: Components Used - Patellar/trochlear Primary Knee 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	7	13.8	(0.35, 76.94)
Avon	Duracon	0	1	0.0	0	0.0	(0.00, 1271)
Avon	Kinemax Plus	1	121	0.8	194	0.5	(0.01, 2.87)
Avon	Nexgen	0	2	0.0	3	0.0	(0.00, 140.5)
Global C Made	-	0	1	0.0	1	0.0	(0.00, 356.4)
LCS	-	1	4	25.0	3	28.9	(0.73, 161.3)
LCS	LCS	3	76	3.9	50	5.9	(1.23, 17.38)
LCS	Nexgen	0	1	0.0	1	0.0	(0.00, 291.6)
LCS	Scorpio	0	1	0.0	1	0.0	(0.00, 504.6)
Lubinus Pat Glide	Duracon	0	27	0.0	21	0.0	(0.00, 17.39)
Lubinus Pat Glide	Lubinus Pat Glide	3	30	10.0	38	7.9	(1.64, 23.20)
MOD III	-	0	1	0.0	2	0.0	(0.00, 231.5)
MOD III	Genesis II	0	1	0.0	0	0.0	(0.00, 2073)
MOD III	LCS	1	4	25.0	6	15.6	(0.40, 86.93)
MOD III	MOD III	3	44	6.8	101	3.0	(0.61, 8.71)
RBK	RBK	0	1	0.0	0	0.0	(0.00, 4812)
Themis	-	0	1	0.0	0	0.0	(0.00, 2105)
Themis	Themis	0	12	0.0	4	0.0	(0.00, 99.80)
Total		**13**	**331**	**3.9**	**433**	**3.0**	**(1.60, 5.13)**

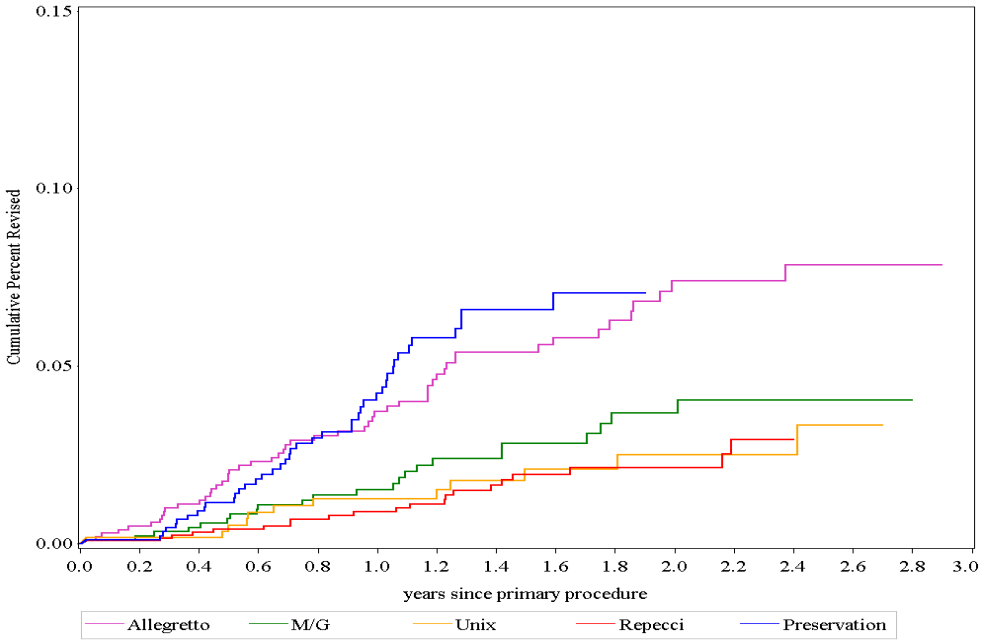
Note: *- equals no patella component used*

Table K40: Total Unicompartmental Primary Knee Procedures requiring Revision

Unicompartmental	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Allegretto Uni Knee	53	1051	5.0	1604	3.3	(2.48, 4.32)
Genesis	11	478	2.3	497	2.2	(1.10, 3.96)
M/G	23	965	2.4	1403	1.6	(1.04, 2.46)
Oxford 3	155	4334	3.6	6553	2.4	(2.01, 2.77)
PFC Sigma	9	137	6.6	348	2.6	(1.18, 4.91)
Preservation	42	1028	4.1	1052	4.0	(2.88, 5.39)
Repecci	23	1348	1.7	1888	1.2	(0.77, 1.83)
Unix	14	708	2.0	1002	1.4	(0.76, 2.35)
Others (8)	19	778	2.4	601	3.2	(1.90, 4.94)
Total	**349**	**10827**	**3.2**	**14948**	**2.3**	**(2.10, 2.59)**

Note: *other (n) equals the number of other prostheses*

Figure K6: Cumulative percentage of Revision of Unicompartmental Knee Prostheses



	Number at risk at start of the period						
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*
Allegretto Uni Knee	1051	892	685	505	311	172	92
Preservation	1028	773	512	225	91	11	0
M/G	965	789	603	416	270	156	69
Unix	708	579	443	318	206	107	26
Repecci	1348	1140	916	619	336	104	13

Figure K7: Cumulative percentage of Revision of Allegretto Uni Knee and Other (M/G, Unix and Repecci) Unicompartmental Knee Prostheses

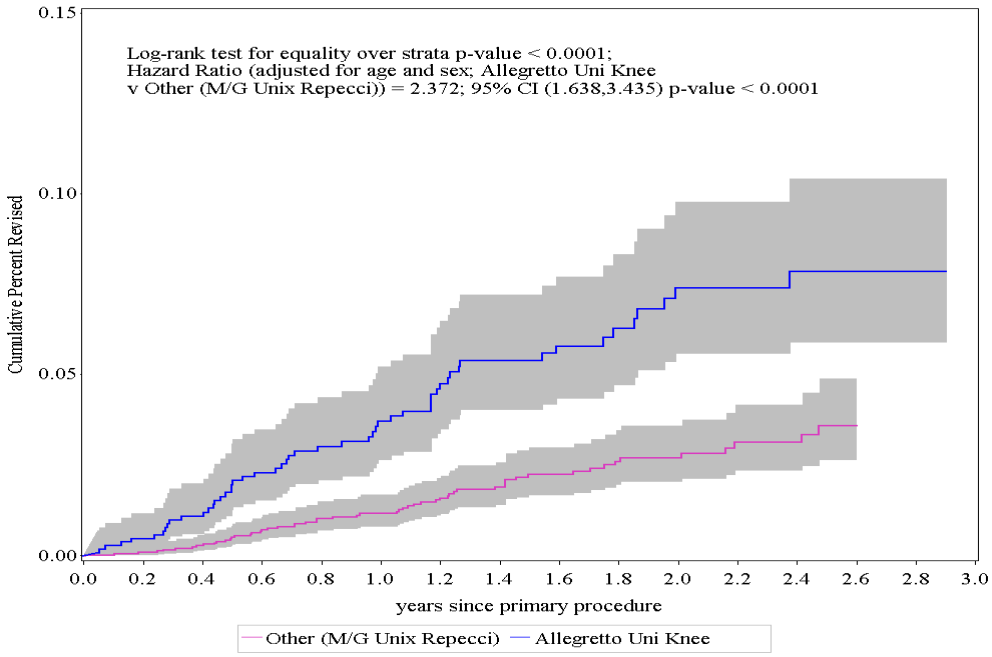
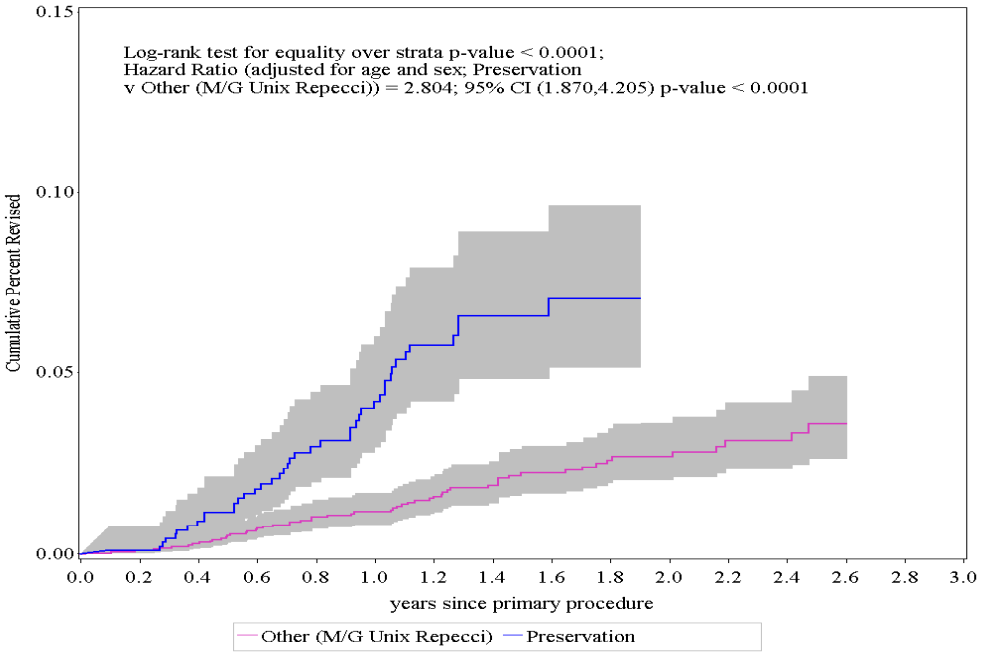


Figure K8: Cumulative percentage of Revision of Preservation Knee and Other (M/G, Unix and Repecci) Unicompartmental Knee Prostheses

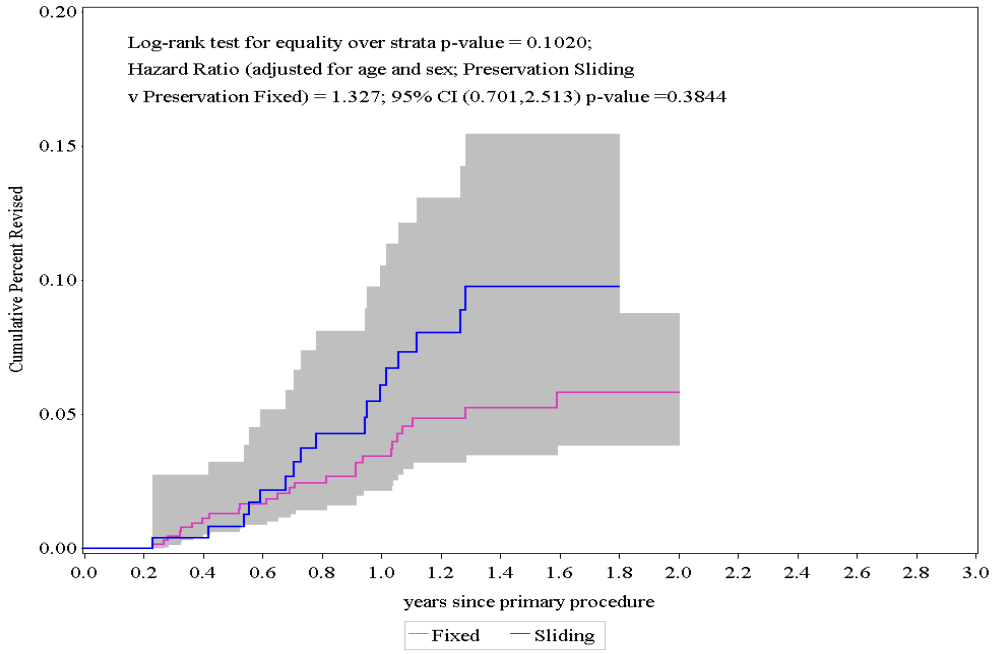


	Number at risk at start of the period						
	0	***0.5***	***1***	***1.5***	***2***	***2.5***	***3.0***
Allegretto Uni Knee	1051	892	685	505	311	172	92
Preservation	1028	773	512	225	91	11	0
Other (M/G Unix Repecci)	3021	2508	1962	1353	812	367	108

Table K41: 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	25	743	3.4	763	3.3	(2.12, 4.84)
Preservation-Sliding	17	285	6.0	290	5.9	(3.42, 9.40)
Total	**42**	**1028**	**4.1**	**1052**	**4.0**	**(2.88, 5.39)**

Figure K9: Cumulative percentage of Revision of Preservation Fixed and Preservation Sliding Unicompartmental Knee Prostheses



	Number at risk at start of the period						
	0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*
Preservation-Fixed	743	547	358	177	78	11	0
Preservation-Sliding	285	226	154	48	13	0	0

Table K42: Total Primary Knee Procedures requiring Revision by Movement

Movement	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Fixed	547	41413	1.3	60168	0.9	(0.83, 0.99)
Rotating	245	13782	1.8	19138	1.3	(1.12, 1.45)
Rotating - Sliding	29	2277	1.3	2999	1.0	(0.65, 1.39)
Sliding	19	811	2.3	2026	0.9	(0.56, 1.46)
Unknown	1	31	3.2	57	1.7	(0.04, 9.74)
Total	**841**	**58314**	**1.4**	**84388**	**1.0**	**(0.93, 1.07)**

Table K43: Total Primary Knee Procedures requiring Revision by Stability

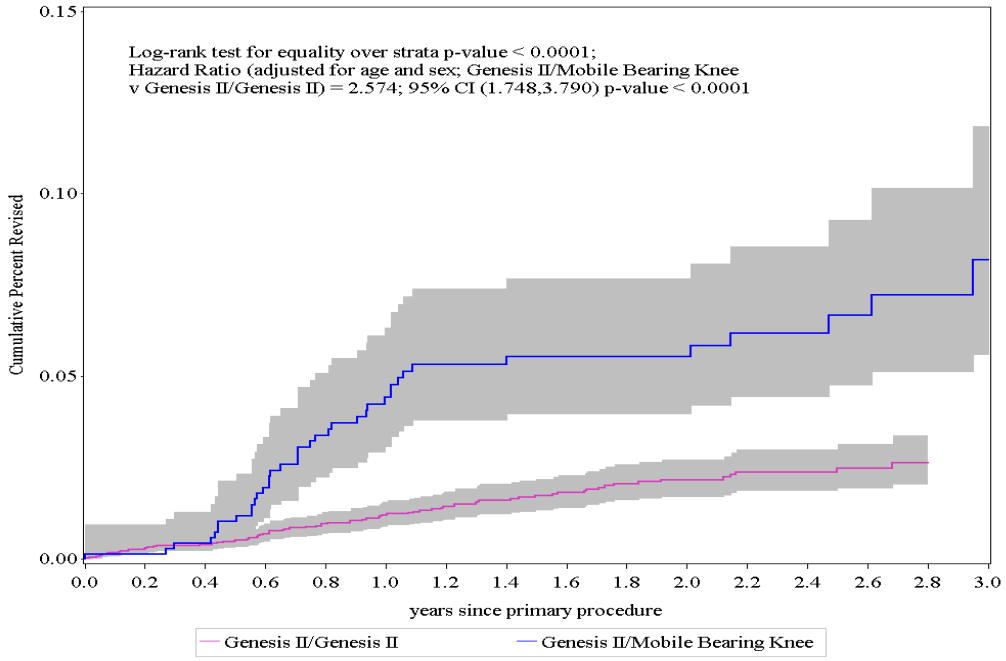
Stability	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Fully Stabilised	4	213	1.9	287	1.4	(0.38, 3.57)
Hinged	3	97	3.1	120	2.5	(0.51, 7.30)
Minimal	708	49623	1.4	72959	1.0	(0.90, 1.04)
Posterior Stabilised	125	8350	1.5	10966	1.1	(0.95, 1.36)
Unknown	1	31	3.2	57	1.7	(0.04, 9.74)
Total	**841**	**58314**	**1.4**	**84388**	**1.0**	**(0.93, 1.07)**

Table K44: 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	24	2009	1.2	3418	0.7	(0.45, 1.04)
AMK	AMK	9	201	4.5	625	1.4	(0.66, 2.73)
Active Knee	Active Knee	9	841	1.1	637	1.4	(0.65, 2.68)
Advance	Advance	15	603	2.5	902	1.7	(0.93, 2.74)
Advantim	Advantim	3	420	0.7	974	0.3	(0.06, 0.90)
Apollo	Apollo	2	284	0.7	551	0.4	(0.04, 1.31)
Duracon	Duracon	127	8420	1.5	12577	1.0	(0.84, 1.20)
Genesis II	Genesis II	79	5294	1.5	7606	1.0	(0.82, 1.29)
Genesis II	Mobile Bearing	39	765	5.1	1297	3.0	(2.14, 4.11)
Kinemax Plus	Kinemax Plus	18	1166	1.5	1941	0.9	(0.55, 1.47)
LCS	LCS	121	6318	1.9	11748	1.0	(0.85, 1.23)
LCS	MBT	29	3233	0.9	3125	0.9	(0.62, 1.33)
Maxim	Maxim	13	1087	1.2	1333	1.0	(0.52, 1.67)
Natural Knee	Natural Knee	30	2350	1.3	3087	1.0	(0.66, 1.39)
Nexgen	Nexgen	49	5788	0.8	8347	0.6	(0.43, 0.78)
Nexgen LPS	Nexgen	28	2458	1.1	3498	0.8	(0.53, 1.16)
Nexgen MBK	Nexgen MBK	8	457	1.8	895	0.9	(0.39, 1.76)
PFC Sigma	PFC Sigma	58	4126	1.4	5733	1.0	(0.77, 1.31)
Profix	Mobile Bearing	21	630	3.3	662	3.2	(1.96, 4.85)
Profix	Profix	30	1963	1.5	2425	1.2	(0.83, 1.77)
RBK	RBK	12	777	1.5	765	1.6	(0.81, 2.74)
Scorpio	Scorpio	24	1999	1.2	2466	1.0	(0.62, 1.45)
Scorpio	Series 7000	42	3266	1.3	4826	0.9	(0.63, 1.18)
Others (70)	-	51	3859	1.3	4949	1.0	(0.77, 1.36)
Total		**841**	**58314**	**1.4**	**84388**	**1.0**	**(0.93, 1.07)**

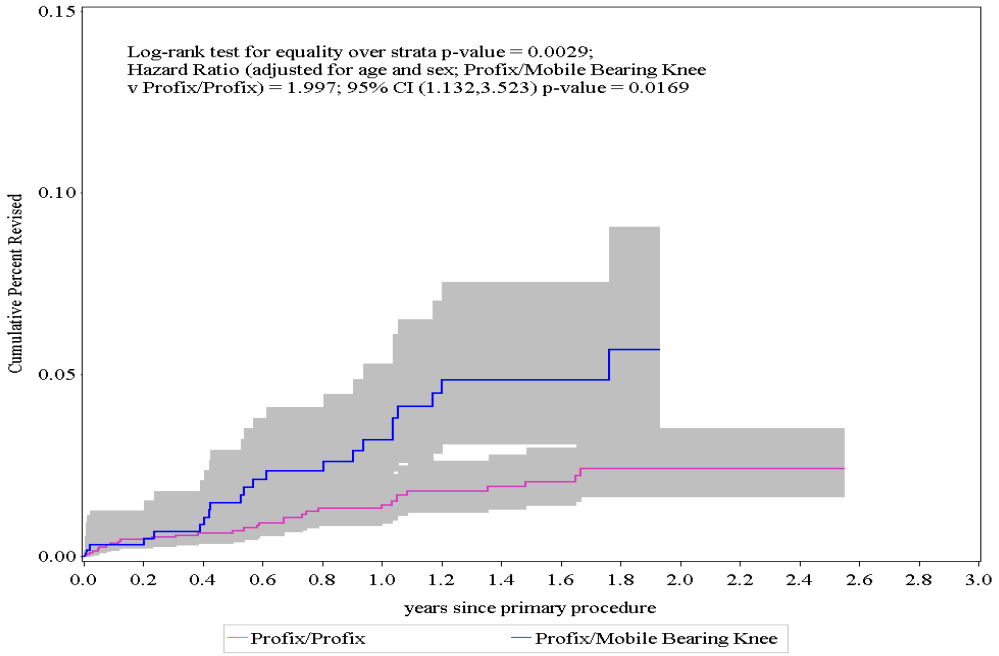
Note: *other (n) equals the number of other types of prostheses*

Figure K10: Cumulative percentage of Revision of Genesis II Tibial components and Mobile Bearing Knee Tibial components used with Genesis II Femoral Components



Femoral	*Tibial*	*Number at risk at start of the period*						
		0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*
Genesis II	Genesis II	5294	4189	3186	2398	1575	880	351
Genesis II	Mobile Bearing	765	649	535	422	311	191	96

Figure K11: Cumulative percentage of Revision of Profix Tibial components and Mobile Bearing Knee Tibial components used with Profix Femoral components



Femoral	*Tibial*	*Number at risk at start of the period*						
		0	*0.5*	*1*	*1.5*	*2*	*2.5*	*3.0*
Profix	Profix	1963	1473	1036	688	373	205	107
Profix	Mobile Bearing	630	467	318	179	53	6	0

Table K45: Revision of Known Revisions: Days between Revisions by Diagnosis of second Revision

Primary Procedure	*Days to revision Procedure*								*Total*	
	< 2 weeks		*2-6 weeks*		*6 weeks - 1 year*		*>1 year*			
	N	*%*	*N*		*%*				*N*	*%*
Infection	13	2.2	36	6.1	196	33.3	33	5.6	278	47.2
Loosening	7	1.2	10	1.7	75	12.7	64	10.9	156	26.5
Pain	.	.	.	.	12	2	11	1.9	23	3.9
Lysis	1	0.2	3	0.5	8	1.4	7	1.2	19	3.2
Instability	.	.	1	0.2	8	1.4	9	1.5	18	3.1
Wear Tibial	1	0.2	.	.	6	1	7	1.2	14	2.4
Implant Breakage Tibial	1	0.2	1	0.2	4	0.7	4	0.7	10	1.7
Dislocation	3	0.5	2	0.3	4	0.7	.	.	9	1.5
Fracture	1	0.2	1	0.2	4	0.7	2	0.3	8	1.4
Patello-Femoral Pain	.	.	.	.	5	0.8	2	0.3	7	1.2
Implant Breakage Patella	.	.	2	0.3	1	0.2	2	0.3	5	0.8
Patella Maltracking	.	.	.	.	4	0.7	1	0.2	5	0.8
Wear Patella	.	.	.	.	4	0.7	1	0.2	5	0.8
Implant Breakage Femoral	.	.	.	.	2	0.3	1	0.2	3	0.5
Incorrect Sizing	.	.	.	.	1	0.2	2	0.3	3	0.5
Progression of Disease	.	.	.	.	1	0.2	2	0.3	3	0.5
Synovitis	1	0.2	.	.	1	0.2	1	0.2	3	0.5
Arthrofibrosis	.	.	.	.	2	0.3	.	.	2	0.3
Bearing/Dislocation	.	.	.	.	2	0.3	.	.	2	0.3
Malalignment	.	.	.	.	2	0.3	.	.	2	0.3
Avascular Necrosis	.	.	.	.	.	.	1	0.2	1	0.2
Other	2	0.3	1	0.2	4	0.7	6	1	13	2.2
Total	**30**	**5.1**	**57**	**9.7**	**346**	**58.7**	**156**	**26.5**	**589**	**100**

Note: *. equals component not exchanged*

Table K46: Multiple Revision Knee Procedures on the same joint

Procedure sequence	*Number*	*%*	*Cumulative Frequency*	*Cumulative Percent*
Primary + Revision	1087	70.72	1087	70.72
Primary + 2 Revisions	89	5.79	1176	76.51
Primary + 3 Revisions	22	1.43	1198	77.94
Primary + 4 Revisions	5	0.33	1203	78.27
Revision + Revision	296	19.26	1499	97.53
Revision + 2 Revisions	29	1.89	1528	99.41
Revision + 3 Revisions	5	0.33	1533	99.74
Revision + 4 Revisions	2	0.13	1535	99.87
Revision + 5 Revisions	2	0.13	1537	100.00

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 31/12/2003.

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 73.2% of all cemented femoral stem fixation for primary and revision procedures. In primary acetabular fixation the top four cements account for 68.0%. Antibiotic cement is used in 52.1% of primary total hip replacement procedures.

There is an increase of 7.5% use of antibiotic cement in revision hip procedures (77.5%) (Table C2).

Cement Use in Knee Replacement

Palacos R continues to be the most commonly used cement in primary knee replacements. Antibiotic cement is used in 57.5% of primary procedures (Table C3). It is used in almost 80% of revision procedures. This is reduced to 64.0% in patella revision.

Palacos R, CMW1g and Antibiotic Simplex are the most common cements used in revision knee procedures. (Table C4).

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	10441	33.1	CMW 1 Plain	1923	22.4
Antibiotic Simplex*	6139	19.5	Simplex P	1476	17.2
Simplex Tobra*	3609	11.4	Palacos R*	1380	16.1
Palacos R*	2675	8.5	Simplex Tobra*	1064	12.4
Cmw 1 Plain	2558	8.1	Antibiotic Simplex	904	10.5
Cmw 1g*	1497	4.7	Cmw 1g*	594	6.9
Palacos E*	1120	3.6	Cmw 2 Plain	469	5.5
Cmw 3g*	755	2.4	Cmw 2g*	434	5.1
Cmw 3 Plain	555	1.8	Palamed G*	113	1.3
Vacumix Cmw 1g*	354	1.1	Cmw 3g*	59	0.7
Other Types (22)	1829	5.8	Other Types (18)	167	1.9
Total	**31532**	**100.0**	**Total**	**8583**	**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*	571	25.8	Palacos R*	536	24.2
Simplex Tobra*	444	20.1	CMW 1G*	453	20.4
Simplex P	325	14.7	Antibiotic Simplex*	323	14.6
Palacos R*	293	13.3	Simplex Tobra*	295	13.3
CMW 1G*	176	8.0	CMW 1 Plain	204	9.2
CMW 1 Plain	102	4.6	Simplex P	128	5.8
Palacos E*	62	2.8	CMW 2G*	95	4.3
CMW 3G*	60	2.7	CMW 2 Plain	61	2.8
Palamed G*	48	2.2	Palamed G*	58	2.6
CMW 3 Plain	30	1.4	CMW 3G*	18	0.8
Other types (14)	98	4.4	Other types (10)	46	2.1
Total	**2209**	**100.0**	**Total**	**2217**	**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*	8058	20.9	Palacos R*	9658	17.9	Palacos R*	4403	18.9
CMW 1 Plain	5850	15.2	CMW 1 Plain	8260	15.3	Antibiotic Simplex*	3362	14.4
Simplex P	5555	14.4	Simplex P	8087	15.0	CMW 1 Plain	3118	13.4
CMW 1G*	4724	12.3	CMW 2 Plain	6625	12.3	Simplex P	3013	12.9
Antibiotic Simplex*	4402	11.4	CMW 1G*	6159	11.4	CMW 2 Plain	2874	12.3
CMW 2 Plain	3403	8.8	Antibiotic Simplex*	5768	10.7	CMW 1G*	2150	9.2
Simplex Tobra*	2094	5.4	Simplex Tobra*	3215	6.0	Simplex Tobra*	1717	7.4
Palamed G*	1738	4.5	CMW 2G*	2511	4.6	Palamed G*	1036	4.4
CMW 2G*	1627	4.2	Palamed G*	2012	3.7	CMW 2G*	826	3.5
Palacos E*	236	0.6	CMW 3G*	345	0.6	Cemex Gent HV*	161	0.7
Other types (19)	870	2.3	Other types (18)	1393	2.6	Other types (16)	672	2.9
Total	**38557**	**100.0**	**Total**	**54033**	**100.0**	**Total**	**23332**	**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*	910	28.8	Palacos R*	1005	26.6	Palacos R*	595	21.1
CMW 1G*	600	19.0	CMW 1G*	731	19.3	CMW 2 Plain	494	17.5
Antibiotic Simplex*	459	14.5	Antibiotic Simplex*	510	13.5	CMW 1G*	418	14.8
Simplex Tobra*	280	8.8	Simplex Tobra*	321	8.5	Antibiotic Simplex*	316	11.2
CMW 1 Plain	186	5.9	CMW 1 Plain	250	6.6	Simplex P	227	8.0
Simplex P	181	5.7	CMW 2 Plain	240	6.3	CMW 1 Plain	216	7.6
CMW 2G*	155	4.9	Simplex P	214	5.7	Simplex Tobra*	189	6.7
Palamed G*	147	4.6	CMW 2G*	205	5.4	CMW 2G*	173	6.1
CMW 2 Plain	139	4.4	Palamed G*	155	4.1	Palamed G*	94	3.3
CMW 3G*	24	0.8	CMW 3G*	33	0.9	CMW 3G*	22	0.8
Other types (13)	84	2.7	Other types (15)	119	3.1	Other types (12)	80	2.8
Total	**3165**	**100.0**	**Total**	**3783**	**100.0**	**Total**	**2824**	**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.

As there is a time lag before completion of the NDI, the AIHW has provided a match for data for the period September 1999 to December 2002. Therefore the mortality data is based only on the data from the 2003 Report.

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, 2002). This provides a true rate. Exact confidence intervals based on the Poisson distribution of the number of observed deaths are also given.

Mortality Associated with Hip Replacement

Mortality associated with hip replacement varies depending on the 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 74.4% for partial hip replacement, 98.1% for primary total hip replacement and 96.1% for revision hip replacement. 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 mortality is highest for partial hip replacement. There is an 11-fold increase in crude cumulative mortality of primary partial hip procedures over primary total hips (25.8% and 2.3%) and a 14-fold increase in the rate per 100 person years (28.85 and 2.08). This difference is not eliminated after adjusting for age and sex; standardised mortality is 14.2% for partial hips and 0.95% for total hips (SMR = 15). The principal diagnosis in this group 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 (Table M1 and Figure M1).

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 comparing the two types of unipolar monoblock, that is, the Austin Moore and Thompson prostheses (Table M2 and Figure M3).

Of interest is the apparent difference in mortality between primary and revision hip procedures. The crude mortality for primary total hips is 2.4% and for revisions, 4.3%. After standardisation for age and gender there is still a difference in the mortality rate for each procedure, 1.05% for primary hips and 1.8% 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. One death has 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 1.66 times greater than unicompartmental knees. There is a 2.1 greater risk following revision knee replacement compared to unicompartmental knee replacement. The hazard ratio between primary total knee replacement and revision knee replacement was 1.27 (Table M3 and Figure M4).

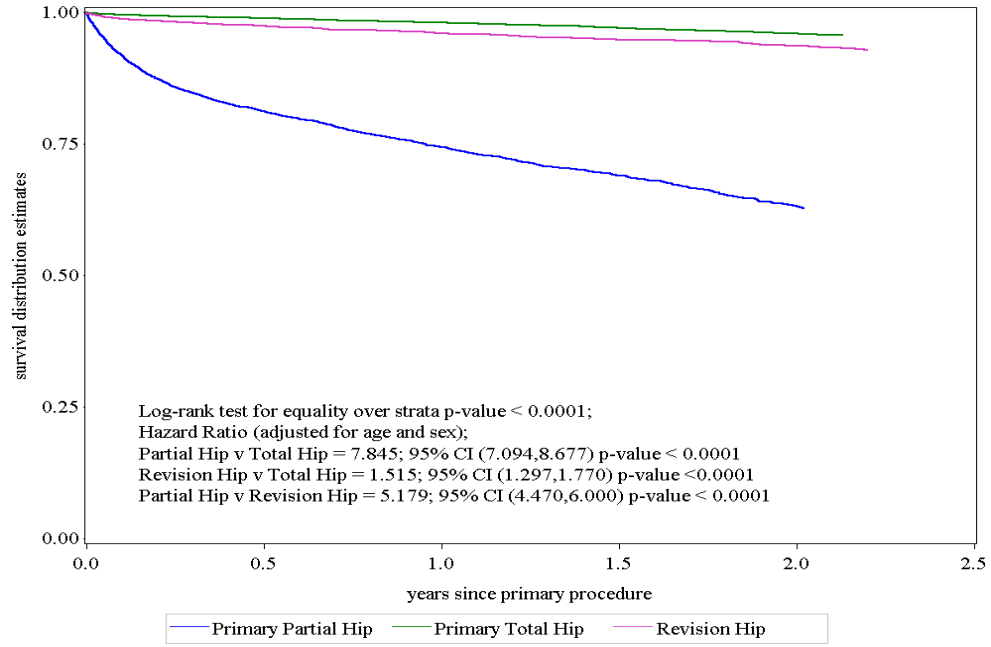
We have examined the mortality data to determine whether there is an increased risk associated with same day bilateral knee replacement for both total as well as unicompartmental knee replacements compared to a unilateral procedure. The analyses were carried out only for the diagnosis of osteoarthritis. Initial results would indicate that the mortality rate associated with undertaking a bilateral procedure on the same day is 0.86 per 100 person years compared to 1.38 for a unilateral procedure (data not shown). We will re-examine differential early mortality following unilateral and bilateral knee replacement as more data become available**.**

Table M1: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2002

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	2049	7929	25.8	14.2286	7101	28.85	(27.62, 30.13)
Primary Total Hip	689	30470	2.3	0.9459	33064	2.08	(1.93, 2.25)
Revision Hip	209	4814	4.3	1.8021	5525	3.78	(3.29, 4.33)
Total	**2947**	**43213**	**6.8**	**1.7343**	**45691**	**6.45**	**(6.22, 6.69)**

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

Figure M1: Kaplan-Meier Survival - following Hip Procedure

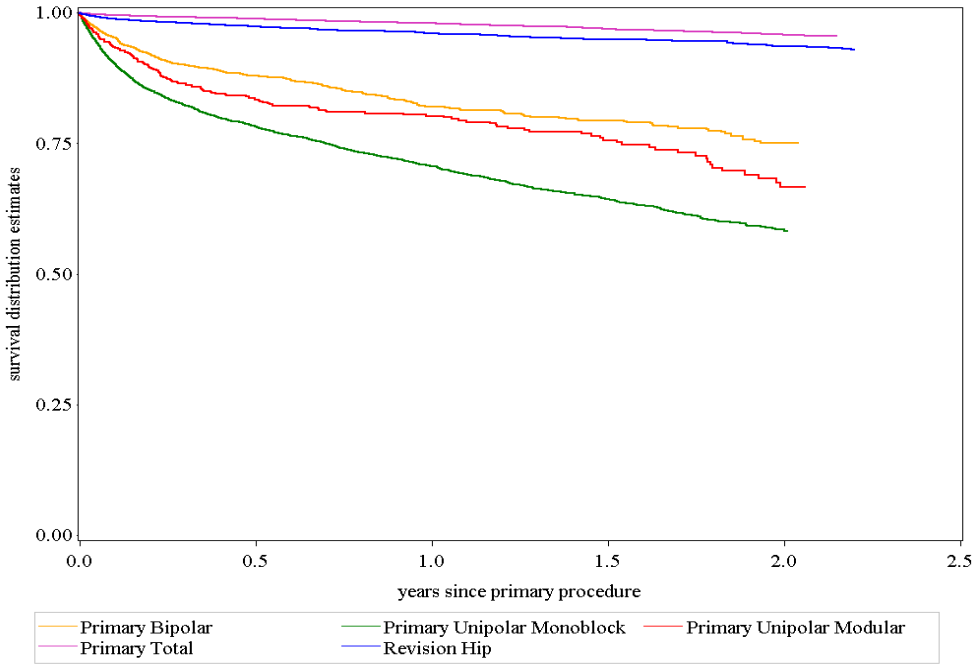


	Number at risk at start of the period					
	0	***0.5***	***1***	***1.5***	***2***	***2.5***
Primary Partial Hip	7929	4764	3018	1712	829	290
Primary Total Hip	30470	22502	14866	8544	3887	1368
Revision Hip	4814	3672	2537	1497	739	263

Table M2: Mortality following Hip Replacement for Hip procedure between September 1999 and December 2002 (Table M1 expanded)

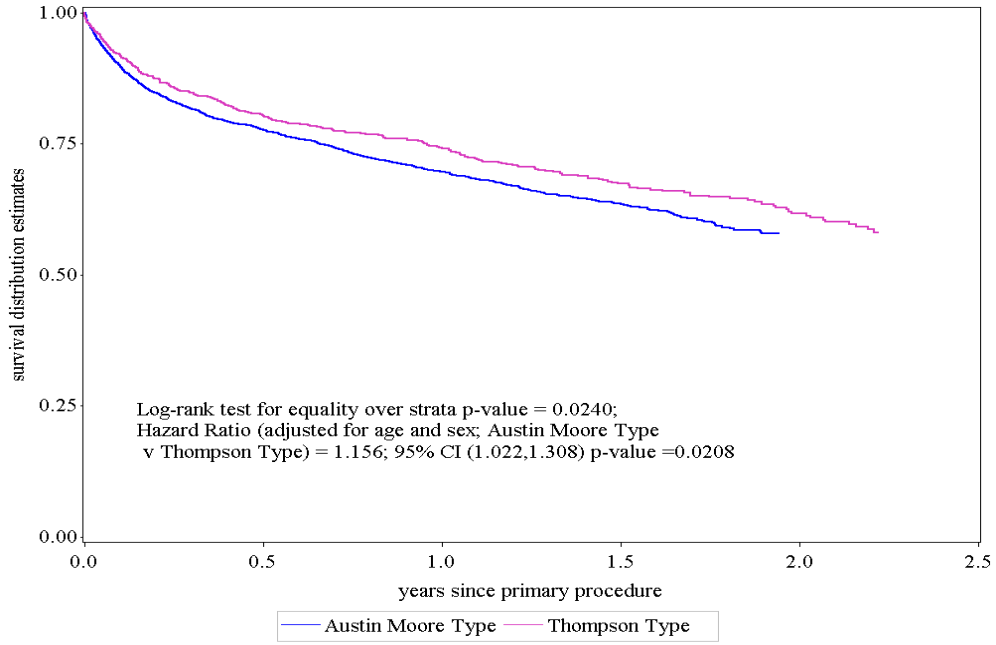
Type of hip replacement	*Number who died*	*Number of patients*	*Cumulative mortality (% who died)*	*Standardised Mortality*	*Person-years*	*Rate per 100 person years*	*Exact 95% CI*
Primary Bipolar	341	2100	16.2	8.4382	1871	18.23	(16.35, 20.27)
Primary Unipolar Mono	1549	5088	30.4	10.4353	4554	34.02	(32.34, 35.75)
Austin-Moore Type	1229	4004	30.7	11.2830	3469	35.43	(33.48, 37.47)
Thompson Type	320	1084	29.5	9.2880	1085	29.50	(26.36, 32.92)
Primary Unipolar Modular	159	741	21.5	12.3414	677	23.49	(19.98, 27.43)
Primary Resurfacing	6	1957	0.3	0.1801	1676	0.36	(0.13, 0.78)
Primary Thrust Plate	0	63	0.0	0.0000	79	0.00	(0.00, 4.67)
Primary Total	683	28450	2.4	1.0505	31310	2.18	(2.02, 2.35)
Revision	209	4814	4.3	1.8021	5525	3.78	(3.29, 4.33)
Total	**2947**	**43213**	**6.8**	**1.7343**	**45691**	**6.45**	**(6.22, 6.69)**

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*
Primary Bipolar	2100	1276	754	426	222	79
Primary Unipolar Mono	5088	3042	1964	1109	524	183
Primary Unipolar Modular	741	446	300	177	83	28
Primary Total	28450	21156	14113	8208	3780	1355
Revision	4814	3672	2537	1497	739	263

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

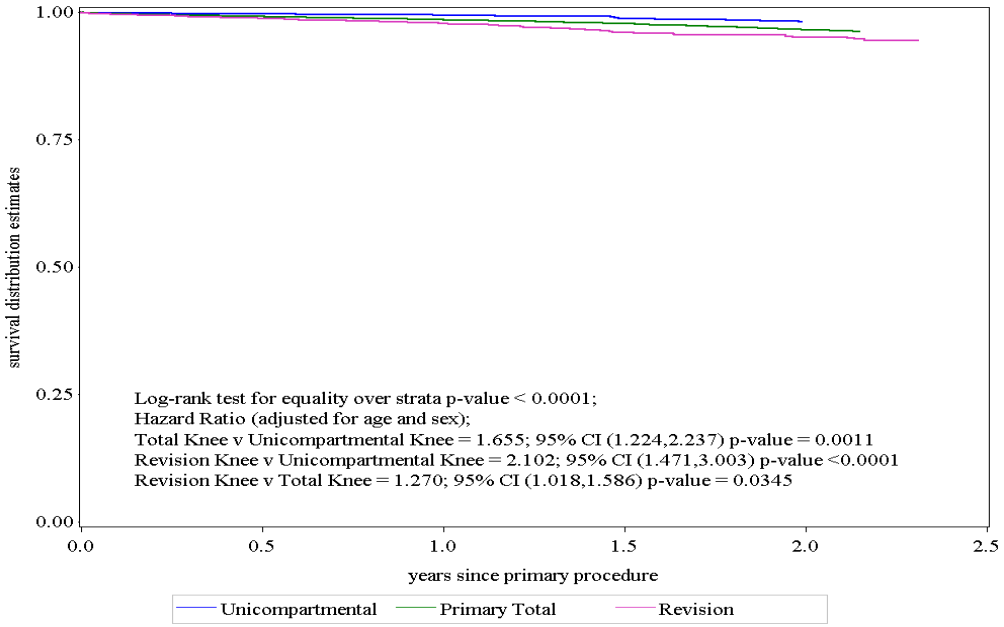


	Number at risk at start of the period					
	0	***0.5***	***1***	***1.5***	***2***	***2.5***
Austin Moore Type	4004	2339	1479	812	363	153
Thompson Type	1084	703	485	297	161	30

Table M3: Number and percentage of people who died following Knee Replacement for Knee procedure between September 1999 and December 2002

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	1	141	0.7	0.35896	166	0.60	(0.02, 3.36)
Unicompartmental	46	5911	0.8	0.22079	5895	0.78	(0.57, 1.04)
Primary Total	568	32314	1.8	1.25714	34909	1.63	(1.50, 1.77)
Revision	91	3158	2.9	0.62659	3821	2.38	(1.92, 2.92)
Total	**706**	**41524**	**1.7**	**1.11643**	**44791**	**1.58**	**(1.46, 1.70)**

Figure M4: Kaplan-Meier Survival - following following Knee Procedure



	Number at risk at start of the period					
	0	*0.5*	*1*	*1.5*	*2*	*2.5*
Patella/trochlear	141	102	76	46	22	10
Unicompartmental	5911	4216	2660	1355	588	157
Primary Total	32314	24018	15539	8786	4140	1549
Revision	3158	2492	1737	1094	535	211

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