AUSTRALIAN ORTHOPAEDIC ASSOCIATION

NATIONAL JOINT REPLACEMENT REGISTRY

Annual Report

2003

AUSTRALIAN ORTHOPAEDIC ASSOCIATION
NATIONAL JOINT REPLACEMENT REGISTRY

ANNUAL REPORT

Prepared by

Professor Stephen Graves
Director

Mr David Davidson
Chairman

Ms Lisa Ingerson
Coordinator

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

REGISTRY COMMITTEE

David Davidson	Chairman
Stephen Graves	Project Director
John Batten	Tasmania
Warwick Bruce	New South Wales
Hugh English	Queensland
Richard de Steiger	Victoria
Peter Morris	Australian Capital Territory
David Wood	Western Australia
James Bodel	Honorary Treasurer
John Cooper	Zimmer
Steven Simpson	Depuy Australia Pty Ltd

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Director
Telephone: 03 9342 8479
Facsimile: 03 9342 8780
Email: stephen.graves@mh.org.au
Department of Orthopaedics
Royal Melbourne Hospital
PARKVILLE VIC 3050

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

Department of Public Health
UNIVERSITY OF ADELAIDE SA 5005

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

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ANNUAL REPORT
2003

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The last remaining hospitals commenced contributing data to the Registry by March 2003. Not all the 296 hospitals listed have provided data for this Report.

SOUTH AUSTRALIA

Public Hospitals

Clare District Hospital
Kay Williamson, CN Theatre
Flinders Medical Centre
Jo Drabsch, CN Theatre
Gawler Health Services
Sharon Soones, RN Theatre
Lyell McEwin Hospital
Trudy Gayler, 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
Leonie Schlein, 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
Linda Saunders, 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, RN Theatre
Blackwood Hospital
Dani McKenna, Clinical Manager, Theatre

SOUTH AUSTRALIA continued

Private Hospitals

Burnside War Memorial Hospital
Debbie Green, 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 Perry, CN Theatre
Sportsmed SA
Sarah Gold, Medical Records
St Andrew's Private Hospital
Paul Grafton, 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 Stokes, RN Theatre

AUSTRALIAN CAPITAL TERRITORY

Private Hospitals

John James Memorial Hospital
Catherine Hindson, ADON Theatre
The National Capital Private Hospital
Kaye Vian, NUM Orthopaedic Theatre

Public Hospitals

The Canberra Hospital
Jo Clayton, 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
Kaylene Page, 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
Stephen Johnston, Orthopaedic Technician Theatre
Geraldton Health Service
Vicki Richards, CN Theatre
Kalgoorlie Regional Hospital
Alison Carlsen, Clinical NUM Theatre
Royal Perth Hospital, Shenton Park
Lesley Pascoe, RN Theatre
Royal Perth Hospital, Wellington St
CarmelMcCormack, NUM Theatre
Sir Charles Gairdner Hospital
Sandra Miller, Quality Improvement Coordinator

Private Hospitals

Fremantle Kayleeya Hospital
Kay Golding, CN Orthopaedic Theatre
Galliers Private Hospital
Debra Carkeeg, Orthopaedic Technician, Theatre
Hollywood Private Hospital
Lyn Bradshaw, 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
Dianne Clarke, RN Theatre
St John of God, Bunbury
Marianne Viebke, NUM Theatre
St John of God, Geraldton
Sue Campbell, RN Theatre
St John of God, Murdoch
Paul Maloney, Orthopaedic Technician Theatre
St John of God, Subiaco
Derek Williams, Orthopaedic Technician Theatre

TASMANIA

Public Hospitals

Launceston General Hospital
Paula Barrass, CN Orthopaedic Theatre
North West Regional Hospital
Bill Kerr, CN Orthopaedic Theatre
Royal Hobart Hospital
Colleen Neal, RN Theatre
Calvary Hospital
Cathryn Chick, CN Orthopaedic Theatre

TASMANIA

Private Hospitals

Hobart Private Hospital
Sarah Bird, Perioperative Services Manager
Mersey Community Hospital
Aitor Baonza, NUM Theatre
North-West Private Hospital
Jo Cain, RN Theatre
St Luke's Hospital
Denise McMahon, Patient Information Manager
St Vincent's Hospital
Stephanie Dilger, Theatre Receptionist

QUEENSLAND

Public Hospitals

Bundaberg Hospital
Karen Smith, Elective Surgery Coordinator
Cairns 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
Adrian Richards, CNC Orthopaedic Theatre
Mackay Hospital
Susan Meyer, RN Theatre
Maryborough Hospital
Heather Zillman RN, Theatre
Mater Misericordiae Public Adult's Hospital
Brigid Gillespie, CN Orthopeadic Theatre
Mater Misericordiae Public Children's *Hospital*
Jess Hadley, CN Theatre
Nambour General Hospital
Janine Detlefson, NUM Theatre
Prince Charles Hospital
Karen Zillman, CNC Theatre
Princess Alexandra Hospital
Audrey Hamilton, RN Theatre
Queen Elizabeth II Jubilee Hospital
Lisa Courtney, RN Theatre
Redcliffe Hospital
Narelle Doss, Health Information Manager
Rockhampton Base Hospital
Liz Murphy, CN Orthopaedic Theatre
Royal Brisbane Hospital
Lillian Olszewski, Department of Orthopaedics
Toowoomba Hospital
Mandy Robinson, RN Theatre
Townsville Hospital
Sharon Cook, RN Orthopaedic Theatre

Participating Hospitals & Coordinators – continued

QUEENSLAND continued

Private Hospitals

Allamanda Private Hospital
Maragaret Law, NUM theatre
Caboolture Hospital
Sue Adams, NUM Theatre
Caloundra Private Hospital
Christine Wells, CN Theatre
Calvary Private Hospital
Karen Muir, RN Theatre
Friendly Society's Hospital
Anne Whalley, Theatre Receptionist
Greenslopes Private Hospital
Jodie Tomkins RN, Yvonne Holmes RN, Theatre
Hillcrest Private Hospital
Lyn Martin, NUM Theatre
Holy Spirit Hospital
Jessica Morris, CN Theatre
Holy Spirit Northside Hospital
Norma Stanley, NUM 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
Alicia Harris, CN Theatre
Mater Misericordiae Private Hospital
Ann Hayward, 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
Tracey Gordon, NUM Theatre
Peninsula Private Hospital
Janene Stewart, NUM Theatre
Pindara Private Hospital
Jan Barclay, Quality Coordinator Theatre
Pioneer Valley Hospital
Scott Cameron, NUM Theatre
Riverview Private Hospital
Liz Cline, CNC Theatre
St Andrew's Private Hospital
Gail Simpson, RN Orthopaedic Theatre
St Andrew's Toowoomba Hospital
Maxine Singleton, RN Theatre
St Andrew's War Memorial Hospital
Judith Kable, NUM Theatre
St Stephen's Private Hospital
Carol Hewson, RN Theatre

QUEENSLAND continued

Private Hospitals

St Vincent's Hospital
Judy Plotecki, RN Perioperative Services
St Vincent's Hospital, Robina
Moira Briggs, NUM Perioperative Services
Sunnybank Private Hospital
Claire Thomas, RN Theatre
The Sunshine Coast Private Hospital
Nerida Domenici, RN Theatre
The Wesley Park Haven Private Hospital
Braydon Rissell, CN Orthopaedic Theatre
Wesley Hospital
Carolyn Wilson, CNM Ward 2M

VICTORIA

Public Hospitals

Austin & Repatriation Medical Centre, Austin Campus
Dennis O'Leary, NUM Theatre
Austin & Repatriation Medical Centre, Repatriation Campus
Ian Manly, NUM Theatre
Ballarat Health Services
Joy Taylor, SNM, Perioperative Services
Bendigo Health Care Group
Marianne Dunn, NUM Theatre
Box Hill Hospital
Helga Ploschke, Quality Coordinator Orthopaedic Services
Cohuna District Hospital
Betty Thompson, CNC Theatre
Colac Community Health Service
Judy Kerr, RN Theatre
Dandenong Hospital
Karen Ferguson, RN, Paul Chung, RN Theatre
East Grampians Health Service
Jenny Sargent, NUM Theatre
Echuca Regional Health
Anne Dick, Associate Charge Nurse Theatre
Goulburn Valley Health
Ross Ebbott, CNS Orthopaedic Theatre
Latrobe Regional Hospital
Karen Little, Associate Unit NUM Theatre
Maroondah Hospital
Jodie Hoogenboom, Associate Unit 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
Peninsula Health Service, Frankston Hospital
Kathy Allars, NUM Theatre
Donna Hadkiss, RN Orthopaedic Theatre
Portland District Health
Julie Sealy, NUM Theatre

Participating Hospitals & Coordinators – continued

VICTORIA continued

Public Hospitals

Sandringham & District Memorial Hospital
Jo Holland, Orthopaedic Pre-admission 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
Robert Cockayne
The Northern Hospital
Siew Perry, AUM Theatre
The Royal Melbourne Hospital
John Carr, RN Theatre
Wangaratta District Base Hospital
Lois Foley, NUM 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,
Vicki Mahaljcek, RN Theatre
Williamstown Hospital
Maureen Clark, ACN Theatre
Wimmera Health Care Group
Pam Muszkieta, NUM Theatre
Wonthaggi District Hospital
Gail Huitema, NUM Theatre

Private Hospitals

Baronor Private Hospital
Chan Leong, NUM Theatre
Bayside Private Hospital
Michelle Donegan, NUM Theatre
Beleura Private Hospital
Jean Leyland, RN Theatre
Bellbird Private Hospital
Sue George, Orthopaedic Case Manager
Cabrini Private Hospital, Brighton
Sharni Clark, Project Officer
Cabrini Private Hospital, Malvern
Sharni Clark, Project Officer
Cotham Private Hospital
Susan Leech, RN Orthopaedic Theatre
Epworth Hospital, Epworth Campus
Tilak Weerakkody, RN Theatre
Epworth Hospital, Bethesda Campus
Ronelle Kok, RN Theatre

VICTORIA continued

Private Hospitals

Freemasons Hospital
Claudia Nozzolillo, CNS Orthopaedic Theatre
Hartwell Private Hospital
Pat Wilding, NUM Theatre
John Fawkner Hospital
Gayle Dodds, RN Theatre
Knox Private Hospital
Sally Thomas, Orthopaedic Liaison Nurse
Latrobe University Medical Centre
Joyce Zara, AUM 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
Janis Webster, NUM Theatre
Northpark Private Hospital
Gail Evans, NUMTheatre
Peninsula Private Hospital
Ruth Honan, ANUM Orthopaedic Theatre
Ringwood Private Hospital
Belinda Vandenberg, CNS Orthopaedic Theatre
Shepparton Private Hospital
Liz Harper, Vicki Lloyd,
Orthopaedic Case Manager
South Eastern Private Hospital
Joanne Masters, RN Theatre
St John of God, Ballarat
Cameron Morgan, Resource Manager
St John of God, Geelong
Gaye Hose, CNS Orthopaedic 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
Gillian Burgess, RN Theatre
The Avenue Hospital
Annellen Watson, RN Theatre
The Geelong Private Hospital
Anne Day, CNS Orthopaedic 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
Sophie Holod, NUM Theatre

NEW SOUTH WALES

Public Hospitals

Albury Base Hospital
Elwyn Black, NUM Theatre
Armidale Hospital
Debbie Spokes, NUM Theatre
Auburn Health Service
Helen Joyce, SN Manager Theatre
Bankstown/Lidcombe Hospital
Richard Ibarra, Orthopaedic Resource Person
Bega District Hospital
Pauline Blair, RN Theatre
Blacktown Hospital
Sergio Jumanong, RN Theatre
Bowral and District Hospital
Barbara Walsh, NUM Theatre
Broken Hill Health Service
Sue Beahl, RN Theatre
Campbelltown Hospital
Bev Hill, CNS Orthopaedic Theatre
Coffs Harbour Health Campus
David Metcalf, Quality Manager
Concord Repatriation Hospital
Cathy Connelly, NUM Theatre
Dubbo Base Hospital
Cathy Chapman, 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
John Hunter Hospital
Pam Arnold, NUM Equipment Theatre
Lismore Base Hospital
Maryanne Wilson RN, Val Armstrong RN, Glen Nettle RN, Theatre
Liverpool Health Service
Ros Berryman, SNM Operating Theatre
Maitland Hospital
Margaret Mantle, NUM Theatre
Manly District Hospital
Karen Jones, NUM Theatre

NEW SOUTH WALES continued

Public Hospitals

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
Orange Health Service
Susie Weeks, CNS 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 LindsayA/NUM Theatre
St George Hospital
Simon Cheng, CNS Orthopaedic Theatre
St Vincent's Public Hospital
Bernadette Keenan, NUM Theatre
Sydney Hospital & Sydney Eye Hospital
Jennifer McLean
Tamworth Base Hospital
Kevin Attart, RN Theatre
The Blue Mountains District ANZAC Memorial Hospital
Cathy Gallimore, NUM Theatre
The Canterbury Hospital
Jenny Cubit, NUM Theatre
The Institute of Rheumatology and Orthopaedic Surgery
Alex Vesley, NUM Theatre
The Prince of Wales Hospital
Phyllis Davis, NUM Theatre
The Sutherland Hospital
Lisa Hatton, RN Theatre
Tweed Heads District Hospital
Chris Ryan, CNS Orthopaedic Theatre
Wagga Wagga Base Hospital
Alison Giese, CNS Orthopaedic Theatre
Westmead Hospital
Dana Bowker, RN Theatre
Wollongong Hospital
Pamela Rex, 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 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
Cape Hawk Private Hospital
Karon Devenish, Quality Manager,
Dianne Stirling, RN 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
Belinda Azhari, RN Theatre
Holroyd Private Hospital
Belinda Azhari, RN Theatre
Hunter Valley Private Hospital
Margaret Water, NUM Theatre
Hunters Hill Private Hospital
Claire McLachlan, NUM Theatre
Hurstville Community Hospital
Linda Lanham, Case Manager
Illawarra Private Hospital
Jan Goldrick, Theatre
Kareena Private Hospital
Carlien Paulin, ADON Theatre
Lake Macquarie Private Hospital
Robert Reddie, Theatre
Lingard Private Hospital
Jo Bryan, NUM Theatre
Macarthur Private Hospital
Brenda Wood, Case Manager General Ward
Mater Misericordiae Private Hospital
Rosemary Laver, Manager Pre-admission Clinic
Mayo Private Hospital
Ms Ellie Richardson, NUM Theatre
Mosman Private Hospital
Sue Long, NUM Theatre
Nepean Private Hospital
Jan Wernadt, NUM Theatre
NIB Private Hospital
Jody 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
Rhonda Nance, NUM Theatre
St Luke's Hospital Complex
Pauline Morely, 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
Jan Hubbard, RN Theatre
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
Lillian Blair, CNS Orthopaedic Theatre
The Hills Private Hospital
Julie Guthrie, Clinical Orthopaedic Coordinator
The Prince of Wales Private Hospital
Amanda Linsley, Specialty Team Leader Orthopaedics
Toronto Private Hospital
Helen Cox, NUM Theatre
Warners Bay Private Hospital
Robyn Dickenson, RN Theatre
Westmead Private Hospital
Leona Higgins, CNS Orthopaedic Theatre
Westside Private Hospital
Ruth Wigley, NUM Theatre

ACKNOWLEDGEMENTS

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

INTRODUCTION

This is the fourth annual report of the Australian Orthopaedic Association National Joint Replacement Registry. Following a successful application in March 1998, the Federal Government provided funding to the Australian Orthopaedic Association (AOA) to establish the National Joint Replacement Registry. Since the release of the 1st Report in 2000 the Registry has continued to grow at a rapid pace. At the time of this Report all 296 Hospitals undertaking joint replacement in Australia have agreed to contribute data to the Registry. At the end of August 2003 the Registry had received information on 125,778 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 this year close to 50,000 joint replacement procedures will be performed. 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 rate of revision surgery 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 effect 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 initial contact with hospital administration and orthopaedic surgeons an Information Collection Document outlining the Registry and data collection was provided to each hospital. The document was prepared in a manner to allow hospital administrations the choice of presenting the document to an ethics, quality assurance or medical advisory committee. Once approval was given, 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 nine South Australian hospitals in September 1999. Since that time all hospitals (296) in Australia that undertake joint replacement have agreed to submit data. Currently the Registry receives information on over 4000 procedures per month.

Data for 2003 Report

This Report has been prepared using data collected during the period September 1999 to December 2002. This includes data from all states. Implementation of the Registry was completed in New South Wales during 2002. Therefore the data from this state is not complete. The Report for 2004 will contain 2003 data, which is the first year that complete national data would have been collected.

Data Collection Method

At this time, 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. Initial discussions with hospitals indicated that most hospitals would prefer to send the information to the Registry electronically. A review of the information collected by the hospitals showed that the majority of hospitals do not collect all the information required by the Registry on either theatre or hospital information systems. These consultations identified the need to collect the minimum data set using paper forms. At this time 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 Validation

Over the last twelve months the Registry has continued to develop the validation process for its hospital supplied data. It does so by comparing its data against data sets provided by state and territory health departments. The Registry receives two forms of state health department data: summary data for the specified ICD-10-AM procedure codes and individual unit record data for the procedures of interest, that is, the specified ICD-10-AM codes.

The validation of Registry data using the health department unit record data is a sequential multi-level matching process. For this Report, 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 to December 2001 as hospitals began contributing to the AOA NJRR). 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 notified to us by each of the state health departments. For the period July 1, 2001 to June 30, 2002 the Registry received 521 notifications in excess of the number contained in the health department unit record data, for those states/territories contributing data. This is an increase of 4.4% over unit record data supplied by health departments. The Registry procedure is to accept that these notifications are correct. For this same period, the total number of procedures provided by health departments in their summary data exceeded the number of records in their unit record data.

On the initial pass of this validation process, 88.6%–91.6% of records were verified (varies by state/territory). 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.

The validation procedure undertaken by the Registry is complex and will require additional work to refine the process. However, we are confident that 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 this year has been the 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.

What is New in 2003

This year the Report has undergone significant rationalisation. In particular, we have reduced the size of tables detailing prosthesis use and revision by focussing on the most commonly used prostheses.

This Report includes a new addition to the way survivorship is reported, for both prostheses (time to revision) and patients (time to death). They are now expressed in terms of observed "component-years" and "person-years" respectively. This is in addition to the simple proportions of prostheses failing or patients dying that have been reported previously. The new measures yield true incidence rates of prosthesis failure and patient mortality that take into account not only *whether* an event occurred but *when*. The incidence rates give an idea of the "density of failures" over the entire observed period of risk for prostheses or patients. Incidence rates of revisions are a component of the algorithm we use to help identify underperforming prostheses (see above).

This Report also includes for the first time a classification of total knee replacements based on stability of the prosthesis and also the degree of movement of the tibial insert.

We have also provided a Glossary of Statistical Terms in Appendix 1 that briefly defines some of the methods used in the Report.

GOVERNMENT JOINT REPLACEMENT DATA 2001 – 2002

The data presented in this section of the Registry Report have been obtained from each state and territory health department. The health departments receive in-patient data on a monthly basis from all public and private hospitals. It includes information on hospital inpatient stay, e.g. reason for admission, length of stay and operation(s) etc. The Registry obtained data for specific ICD-10-AM codes (see Appendix 4) on the number and type of joint replacement procedures undertaken in public and private hospitals for the period 1st July 2001 to 30th June 2002. While the accuracy of the data collected from the health departments is likely to be high the Registry is not aware that any validation has been undertaken. These data provide general information on the frequency of joint replacement but do not provide any prosthesis or outcome information. 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 total number of hip and knee replacement procedures for this period was 52,788 (Table G1). Hip and knee joint replacement increased from 46,537 last year, which is an overall increase of 13.4% (Table G2). As in the previous year most of this increase occurred within the private hospital system. Combining hip and knee replacements there has been a 17.2% increase in the private sector and an 8.1% in the public sector. Hip replacement increased by 13.9% in the private sector compared to 5.5% in the public sector. The number of knee replacements increased by 20.1% in the private sector and 12.0% in the public sector (Tables G4, G5 and G6).

The overall increase in hip and knee replacement for the year comprises a 9.9% increase in hip procedures and a 17.2% increase in knee procedures. Primary total hip replacement increased by 13.0% and primary total knee replacements by 18.6%. Patellar/trochlear procedures increased by 16.0% and unicompartmental increased by 15.8% (Table G2).

The largest increase in hip and knee joint replacement was in ACT/NT (24.1%). Queensland had an increase of 19.3% and New South Wales 13.5%. Tasmania and Western Australia had the lowest increases (7.5% and 7.6% respectively, Table G3).

There are some differences between the states and territories in the percentage of the different types of hip replacement procedures undertaken. Partial hip replacement varied from 16.8% in Tasmania to 23.9% in Queensland. Primary hip replacement ranged from 61.3% in Queensland to 71.4% in Australian Capital Territory/Northern Territory (Table G1).

The percentage of revision hip replacement procedures for Australia during this period was 13.9% (Graph G4). It is important to emphasize this is not the revision rate but is the proportion of hip replacement procedures that are revisions. It is not possible to determine from the health department data which types of hip replacements (partial, primary or revision) have been revised. The Territories (ACT/NT) had the lowest proportion of revision hip replacement (10.8%) and Queensland the highest (14.8%).

There is considerable variation in the proportion of unicompartmental knee replacement. South Australia had the highest proportion with 17.2% and Tasmania had the lowest with 3.5%. Primary total knee replacement varied from 71.6% in South Australia to 84.9% in Tasmania (Table G1). The national percentage for revision knee surgery is 8.8% (Graph G5). As for hips, it is not possible to determine which types of replacements (patellar/trochlear, uni-compartmental, primary or revision) have

been revised. Australian Capital Territory/Northern Territory had the lowest percentage of revision knee replacement (6.6%) and Tasmania had the highest (10.8%).

Incidence per 100,000 population for all hip replacement procedures differs between the states and territories. This has not been age or sex adjusted as we do not obtain that data from the health departments. The incidence of hip replacement has increased over the last year and remains highest in Tasmania (180.5) and South Australia (176.3) and lowest in Queensland (114.2) and Australian Capital Territory/Northern Territory (109.4) (Table G7).

Similar variations between state and territories are also evident for knee replacement. South Australia has the highest incidence (173.9). The incidence of total knee replacement remains relatively low in Victoria (109.8).

It is unknown why these differences exist. However the data clearly indicates the continuing increase in joint replacement surgery within Australia (Table G6). This has been occurring consistently over many years (Tables G9 and G10).

Note: *Some figures will vary from previous years due to a revision of the ICD-10-AM codes and updated numbers. Some entries do not equal 100% due to rounding.*

Table G1: Number *(percent)* of Hip & Knee Replacements Nationally 1/7/2001 – 30/6/2002

Type of joint replacement	*NSW*	*VIC*	*QLD*	*WA*	*SA*	*TAS*	*ACT/ NT*	*Aust. total*
Hip replacement								
Partial	1,751	1,484	1014	514	592	144	102	5,601
	(20.4)	*(20.7)*	*(23.9)*	*(19.9)*	*(22.1)*	*(16.8)*	*(17.8)*	*(21.0)*
Primary total	5630	4723	2594	1709	1723	590	409	17378
	(65.5)	*(65.9*	*(61.3)*	*(66.2)*	*(64.2)*	*(69.0)*	*(71.4)*	*(65.1)*
Revision	1213	960	627	359	368	121	62	3710
	(14.1)	*(13.4*	*(14.8)*	*(13.9)*	*(13.7)*	*(14.2)*	*(10.8)*	*(13.9)*
Total	**8594**	**7167**	**4235**	**2582**	**2683**	**855**	**573**	**26689**
	(100.0)	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*
Knee replacement								
Patellar/trochlear	136	43	24	15	19	5	4	246
	(1.4)	*(0.8)*	*(0.5)*	*(0.6)*	*(0.7)*	*(0.8)*	*(0.6)*	*(0.9)*
Unicompartmental	1603	599	339	138	456	21	88	3244
	(16.4)	*(11.2)*	*(7.2)*	*(5.9)*	*(17.2)*	*(3.5)*	*(13.5)*	*(12.4)*
Primary total	7247	4233	3958	1942	1894	505	517	20296
	(74.2)	*(79.0)*	*(83.6)*	*(83.3)*	*(71.6)*	*(84.9)*	*(79.3)*	*(77.8)*
Revision	782	486	415	235	278	64	43	2303
	(8.0)	*(9.1)*	*(8.8)*	*(10.1)*	*(10.5)*	*(10.8)*	*(6.6)*	*(8.8)*
Total	**9768**	**5361**	**4736**	**2330**	**2647**	**595**	**652**	**26089**
	(100.0)	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*	*(100.0)*
State Hip/KneeTotal	**18362**	**12528**	**8971**	**4912**	**5330**	**1450**	**1225**	**52778**

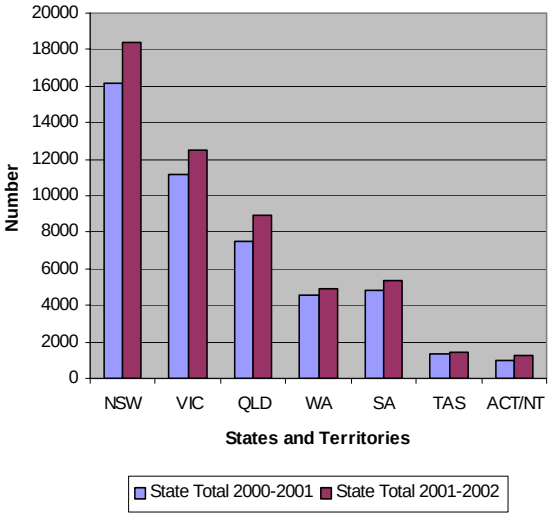
Table G2: Hip and Knee Joint Replacement Percentage Changes 1/7/2001 – 30/6/2002 Relative to 1/7/2000 – 30/6/2001

Type of joint replacement	Aust. Total 1/7/'99-30/6/'00	Aust. Total 1/7/'00-30/6/'01	Aust. Total 1/7/'01-30/6/'02	Percentage change relative to 2000-2001
Hip replacement				
Partial	5285	5465	5601	2.5
Primary total	14193	15377	17378	13.0
Revision	3239	3443	3710	7.8
Total	**22717**	**24285**	**26689**	**9.9**
Knee replacement				
Patellar/trochlear	179	212	246	16.0
Unicompartmental	2165	2802	3244	15.8
Primary total	15597	17119	20296	18.6
Revision	1995	2119	2303	8.7
Total	**19936**	**22252**	**26089**	**17.2**
National Total	**42653**	**46537**	**52778**	**13.4**

Table G3: State and Territories Number and Percentage Changes for combined Hip and Knee Replacement 1/7/2001 – 30/6/2002 Relative to 1/7/2000 – 30/6/2001

States and Territories	State Total 1/7/'99-30/6/'00	State Total 1/7/'00-30/6/'01	State Total 1/7/'01-30/6/'02	Percentage change relative to 2000 – 2001
NSW	15060	16179	18362	13.5
VIC	10025	11121	12528	12.7
QLD	6765	7518	8971	19.3
WA	4432	4565	4912	7.6
SA	4208	4818	5330	10.6
TAS	1118	1349	1450	7.5
ACT/NT	1045	987	1225	24.1
National Total	**42653**	**46537**	**52778**	**13.4**

Graph G1: State & Territories Total Joint Replacements 1/7/2000 – 30/6/2001 & 1/7/2001 – 30/6/2002



Graph G2: Hip and Knee Joint Replacement Surgery Public & Private Hospitals 1/7/2001 – 30/6/2002

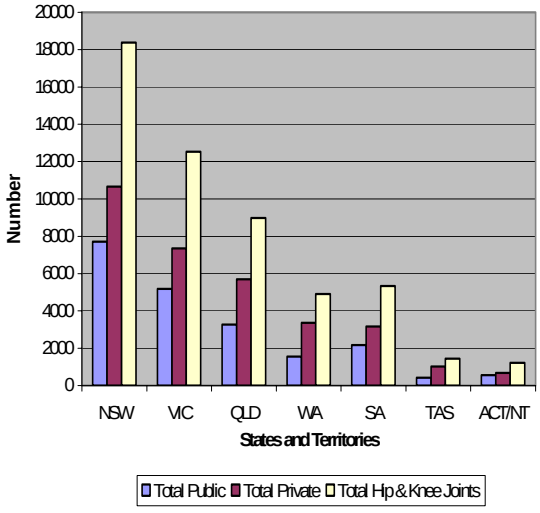


Table G4: Public & Private Percentage Changes per year for Hip and knee replacement for the last 5 years 1st July – 30th June

Year	*Public*	*Private*	*Total Joints (hip & knee)*
1997-1998	18777 ***(N/A)***	19919 ***(N/A)***	38696 ***(N/A)***
1998-1999	19195 ***(2.2%)***	21437 ***(7.6%)***	40632 ***(5.0%)***
1999-2000	19193 ***(0.0%)***	23460 ***(9.4%)***	42653 ***(5.0%)***
2000-2001	19290 ***(0.5%)***	27247 ***(16.1%)***	46537 ***(9.1%)***
2001-2002	20851 ***(8.1%)***	31937 ***(17.2%)***	52788 ***(13.4%)***

Table G5: Public & Private Percentage Changes for Hip replacement per year for the last 5 years 1st July – 30th June

Year	*Public*	*Private*	*Total (hip)*
1997-1998	11417 ***(N/A)***	9962 ***(N/A)***	21379 ***(N/A)***
1998-1999	11455 ***(0.3%)***	10345 ***(3.8%)***	21800 ***(2.9%)***
1999-2000	11493 ***(0.3%)***	11224 ***(8.5%)***	22717 ***(4.2%)***
2000-2001	11547 ***(0.5%)***	12738 ***(13.5%)***	24285 ***(6.9%)***
2001-2002	12179 ***(5.5%)***	14510 ***(13.9%)***	26689 ***(9.9%)***

Table G6: Public & Private Percentage Changes for Knee replacement per year for the last 5 years 1st July – 30th June

Year	*Public*	*Private*	*Total (knee)*
1997-1998	7360 ***(N/A)***	9957 ***(N/A)***	17317 ***(N/A)***
1998-1999	7740 ***(5.2%)***	11092 ***(11.4%)***	18832 ***(8.7%)***
1999-2000	7700 ***(-0.5%)***	12236 ***(10.3%)***	19936 ***(5.9%)***
2000-2001	7743 ***(0.6%)***	14509 ***(18.6%)***	22252 ***(11.6%)***
2001-2002	8672 ***(12.0%)***	17427 ***(20.1%)***	26099 ***(17.3%)***

Incidence of Hip and Knee Replacement

Table G7: Incidence of Hip and Knee Joint Replacement per State & Territory per 100,000 population for 2001 - 2002

Type of joint replacement	*NSW* **Pop.** *6663700*	*VIC* **Pop.** *4883300*	*QLD* **Pop.** *3708700*	*WA* **Pop.** *1929300*	*SA* **Pop.** *1522200*	*TAS* **Pop.** *473600*	*ACT/NT* **Pop.** *523700*	*AUST.* *Pop.* *19707200*
Hip replacement								
Partial	26.3	30.4	27.3	26.6	38.9	30.4	19.5	28.4
Primary total	84.5	96.7	69.9	88.6	113.2	124.6	78.1	88.2
Revision	18.2	19.7	16.9	18.6	24.2	25.5	11.8	18.8
Total	**129.0**	**146.8**	**114.2**	**133.8**	**176.3**	**180.5**	**109.4**	**135.4**
Knee replacement								
Patellar/trochlear	2.0	0.9	0.6	0.8	1.2	1.1	0.8	1.2
Unicompartmental	24.1	12.3	9.1	7.2	30.0	4.4	16.8	16.5
Primary total	108.8	86.7	106.7	100.7	124.4	106.6	98.7	103.0
Revision	11.7	10.0	11.2	12.2	18.3	13.5	8.2	11.7
Total	**146.6**	**109.8**	**127.7**	**120.8**	**173.9**	**125.6**	**124.5**	**132.4**
State total	**275.6**	**256.5**	**241.9**	**254.6**	**350.2**	**306.2**	**233.9**	**267.8**

Note: *The Total Australian population includes Cocos Island, Xmas Island and Jarvis Bay Territory. The displayed value of the total hip and knee replacement rate per 100,000 population may not equal the sum of the displayed figures due to rounding.*

The population figures were obtained from the Australian Bureau of Statistics. Australian Demographics Statistics publication no. 3101.0, June quarter, 2002.

Graph G3: Incidence of Joint Replacement by State & Territories 2001 - 2002

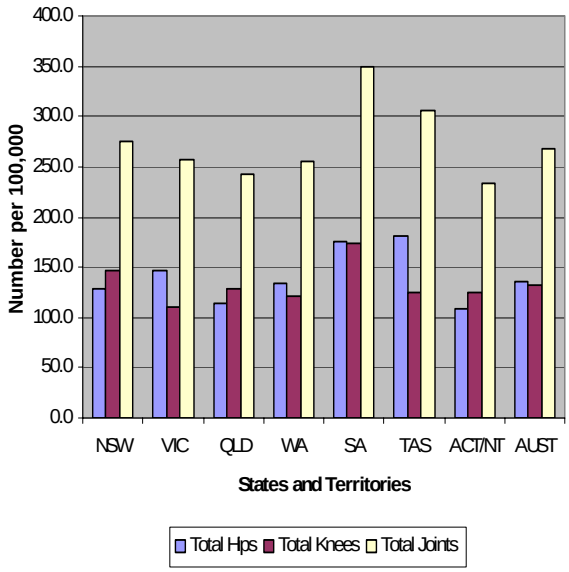
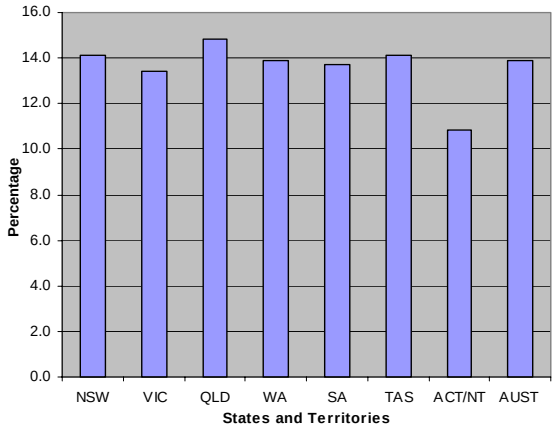


Table G8: Incidence of Different Hip and Knee Joint Replacement Procedures per 100,000 population for Australia for 1998-1999 to 2001 - 2002

Type of joint replacement *population as at June 30th*	**1/7/98-30/6/99** *18730359*	**1/7/99-30/6/00** *18966800*	**191/7/00-30/6/01** *19157200*	**1/7/01-1/6/02** *19386700*
Hip replacement				
Partial	26.7	27.6	28.2	28.9
Primary total	73.0	74.1	79.3	89.6
Revision	15.2	16.9	17.8	19.1
Total	**114.9**	**118.6**	**125.3**	**137.7**
Knee replacement			0.0	0.0
Femoral Trochlear	N/A	0.9	1.1	1.3
Unilateral	N/A	11.3	14.5	16.7
Primary total	90.1	81.4	88.3	104.7
Revision	9.1	10.4	10.9	11.9
Total	**99.3**	**104.1**	**114.8**	**134.6**
Total	**214.2**	**222.6**	**240.0**	**272.2**

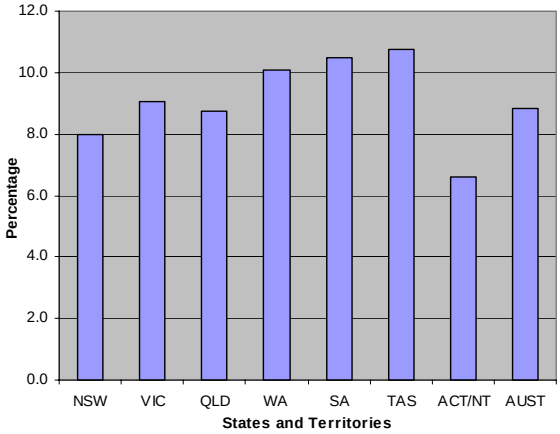
Revision Surgery for 2001-2002

Graph G4: Percentage of Revision Hip Replacement 2001 - 2002



Graph 4 represents, within each state, the percentage of hip surgery that was revision surgery for 2001 – 2002. It is not possible to determine which type (partial, primary or revision) of hip replacement had been revised.

Graph G5: Percentage of Revision Knee Replacement 2001 - 2002



Graph 5 represents, within each state, the percentage of knee surgery that was revision surgery for 2001 – 2002. Primary total or uni as well as revision knee replacements may have been revised.

Table G9: Hip and Knee replacement procedures from 1994-1995 including percentage change per year as total percentage change from 1994-1995 to 2001-2002

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	14542	8.8	33,674	5.2
1996-1997	20,127	5.2	15456	6.3	35,583	5.7
1997-1998	21379	6.2	17317	12.0	38696	8.7
1998-1999	21800	2.0	18832	8.7	40632	5.0
1999-2000	22717	4.2	19936	5.9	42653	5.0
2000-2001	24285	6.9	22252	11.6	46537	9.1
2001-2002	26689	9.9	26089	17.2	52788	13.4
1994/95-2001/02		**43.2**		**95.1**		**64.9**

Note: *N/A indicates not applicable. Bilaterals are counted as two replacements from 2000-01.*

Table G10: Percentage change 1994-1995 to 2001-2002 for hip and knee replacement procedures, by state

Type of joint replacement	*NSW* %	*VIC* %	*QLD* %	*WA* %	*SA* %	*TAS* %	*ACT/NT* %	*Aust total* %
Hip replacement								
Partial	21.8	15.8	58.4	22.1	14.5	25.2	72.9	25.3
Primary total	45.2	50.8	67.4	67.4	46.8	39.2	68.3	52.2
Revision	34.5	29.7	59.1	38.1	12.9	68.1	26.5	35.3
Total hips	**38.2**	**39.1**	**63.9**	**51.7**	**33.0**	**39.9**	**63.2**	**43.2**
Knee replacement								
Femoral Trochlear	#	#	#	#	#	#	#	#
Unicompartmental	#	#	#	#	#	#	#	#
Primary total	57.8	66.8	82.9	71.6	64.7	70.6	227.2	68.7
Revision	54.9	77.4	77.4	71.5	105.9	326.7	4.9	71.7
Total knees	**91.6**	**90.6**	**97.5**	**83.6**	**106.0**	**91.3**	**227.6**	**95.1**
Total Hip & Knee	**62.3**	**57.3**	**80.1**	**65.3**	**61.4**	**57.3**	**122.7**	**64.9**

Note: *# indicates not known. Femoral Trochlear and Unicompartmental data were collected separately for the first time in 1999-2000.*

AOA National Joint Replacement Registry
Hip Replacement Data

The AOA NJRR data analysed for this Report was collected from 1/9/1999 to 31/12/2002. As mentioned in previous reports the staged, state-by-state implementation of the Registry has meant that an increasing proportion of the total national joint replacement data has been collected as time has progressed. The Registry recorded 24,425 hip procedures undertaken in 2002, which is well over 90% of hip procedures undertaken in Australia during 2002. The major difference between the reports produced this year and last year is that this Report now includes most of the 2002 data from the majority of NSW hospitals undertaking joint replacement surgery. The 2004 Report will include the 2003 data, which will be the first year that the Registry will collect complete data nationally.

Demographics and Diagnosis

Information on 47,148 hip replacement procedures is presented. This is just over twice the number of procedures reported last year. There has been little change in the demographic data compared to that reported previously. The majority of procedures are primary total hip replacements (69.6%) followed by primary partial hip replacement (17.2%) and revision hips (13.1%) (Table H1).

Compared to the 2002 Report there has been a slight reduction in the mean age of patients undergoing all hip procedures. This is reflected in partial, primary total as well as revision hip replacements (Tables H2-H5). The gender distribution is almost identical to that previously reported (Tables H2-H5). The number of females undergoing all types of hip replacement is greater than males, in particular partial hip replacements where the ratio is approximately 3 to 1 (Table H3).

The most common diagnosis for primary partial hip replacement (which includes unipolar monoblock and modular replacements as well as bipolar hip replacement) is fractured neck of femur. This accounts for 94.6% of all procedures (Table H6).

Osteoarthritis is the principal diagnosis for primary total hip replacement (which includes conventional total hips as well as resurfacing hip replacement and a small number of thrust plate procedures) (87.9%). There is little change in the proportion of other diagnoses (Table H7).

Aseptic loosening and lysis is the diagnosis for just over 61% of all revisions. Dislocation accounts for 14.8 % and infection 7.2% of all revisions (Table H8). It is important to emphasise that this is not the infection rate but the proportion of revisions that are undertaken for infection.

Prosthesis Usage and Fixation for Primary Partial Hip Replacement

This Report details information on 8,113 primary partial hip replacements. The unipolar monoblock (Austin Moore and Thompson) prosthesis is the most common partial hip replacement (64%). Bipolar replacements account for 26.5% and unipolar modular hip replacements 9.5% (Table H9). There has been a small increase in the use of the bipolar prosthesis type (22.2% to 26.5%) compared to the 2002 Report.

The Austin Moore remains the most common unipolar monoblock prosthesis (78.6%). The vast majority are inserted cementless. The Thompson is the other prosthesis in this group. All but a few have been inserted with cement (Table H10(a)). Cemented stems were most popular when a unipolar modular prostheses was used (88.1%) (Table H10(b)). There were 16 different varieties of cemented stems and 9 cementless stems used in combination with unipolar modular heads.

As with the unipolar modular prosthesis the majority of femoral stems used with bipolar

prosthesis are cemented (89.5%). There has been an increase in the number of different types of prosthesis being used with 30 different cemented stems and 28 cementless stems recorded (Table H10(c)). There were 17 different bipolar components used; the 10 most common are listed (Table H11).

Prosthesis Usage and Fixation for Primary Total Hip Replacement

The 32836 primary total hip replacements include cemented, cementless and hybrid conventional total hips as well as 2201 resurfacing and thrust plate prostheses (Table H12). The inclusion in this analysis of an increasing proportion of NSW data has changed the distribution of the various types of fixation used when compared to last year. The proportion of cementless fixation has increased and is now 41% of all primary total hips. Both cemented and hybrid hip replacements have reduced to 18.2% and 34% respectively.

The relative proportion of fixation methods varies between states and territories. The state and territory data is presented (Table H12). Cement fixation of both components is most common in Queensland accounting for 40.5% of all primary total hips. In NSW the use of cemented primary total hips is considerably less (4.5%).

Victoria has almost double the rate of resurfacing procedures compared to other states; 11% of all primary total hip replacements. Resurfacing and the small number of thrust plate procedures account for 6.7% of all primary total hips within Australia (Table H12). This has increased from 5.1% reported last year.

There is a large number of different femoral (128) (Tables H19 and H20) and acetabular (105) (Tables H22 and H23) components being used. Mixing and matching of these components has resulted in almost 600 different combinations being recorded. There are 72 different cementless stems and 56 cemented stems. The 10 most common cementless stems are used in 70% of cementless total hip procedures. Many of the remaining 62 have been used in small numbers (that is less than 10). Cementless acetabular components are used much more frequently than cemented components. They account for 81.5% of all acetabular components. Of the most common acetabular components, the top 8 are all cementless (Table H24).

The Exeter stem remains the most common stem in primary total hip replacement. It is used in 37.2% of procedures when cemented stems are used and 21.7% of all the primary total hip replacements (Tables H19 and H21). The Exeter stem has been used with 38 different acetabular components (Tables H13 and H15). The next most common femoral component is the BHR resurfacing (6.2%) (Table H21). The most common cementless stem is the ABG2 (11.2% of cementless stems and 4.7% of all stems) (Tables H20 and H21). The Trident is the most common acetabular component (14.2% of all acetabular components) (Table H24). Only one cemented acetabular component features in the ten most common. That is the Contemporary cup, which is used in 4.4% of all primary total hips (Table H24).

Prosthesis Usage and Fixation for Revision Hip Replacement

The Registry classifies revisions as either major or minor. A major revision is defined as a procedure where a major component has been used. A major component is a component that interfaces with bone. Insertion of a stem is a major revision. The same applies to an acetabular cup or shell. The insertion of a femoral head or acetabular insert or any other components that do not interface with bone is regarded as a minor revision.

When considering the 6199 revisions recorded by the Registry the majority, 86.3%, are major revisions. The most common form of major revision is replacement of both the femoral and acetabular components (39.6%) closely followed by revision of the acetabular component only (34.6%). When a major revision is performed the acetabular component is revised almost 80% of the time and the femoral component 65.4% (Table H25). When both femoral and acetabular components are revised cementless fixation has been used in 46.9% of cases, hybrid fixation 28.9% and entirely

cemented in 24.3% (Table H27). Prostheses were removed and not replaced in 3.6% of all major revisions (Table H27). Half of these had a cement spacer inserted.

Minor revisions most commonly involve the replacement of both the insert and the femoral head (70%). In all minor revisions the insert is replaced on 76.4% of occasions (Table H26).

The most common stem used in revision surgery is the cemented Exeter. The most common cementless stem is the S-Rom (Tables H34 and H35). As with primary total hip replacement the most common acetabular component is cementless. This is the Trident acetabular component. The most common cemented acetabular component is the Contemporary cup (Tables H36 and H37).

Bilateral Hip Replacement

When bilateral hip procedures are undertaken 7.5% are performed on the same day. The majority are bilateral total hips and of these almost one third are bilateral resurfacing procedures. Of the remainder, 40.8% are undertaken between 6 weeks and 6 months and 48.2% are undertaken more than 6 months later. Small numbers of individuals had the contralateral hip procedure performed less than 2 weeks but not same day (1.6%) and between 2-6 weeks (1.8%) (Table H39).

Registry Recorded Primary to Revision Hip Replacement

This section deals with revision surgery that has been undertaken on primary hip replacement procedures previously recorded in the Registry database. There are 181 revisions of partial hip replacements and 426 revisions of primary total hips, which accounts for 9.8% of all revisions recorded by the Registry. The proportion of primary procedures revised is 1.5%. Primary total hip has the lowest revision rate (1.3%) and unipolar monoblock the highest (2.6%) Table H40).

As the Registry has only been in existence for a short period all revisions where the previous primary procedure has been recorded have been undertaken soon after the initial surgery. The vast majority 85.3% have been revised less than 12 months from the initial procedure (Table H40). As such they represent early failures.

The most common reason for early revision is dislocation. This accounts for 32.4% of all early revisions. Fracture is high at 19.2% due to the inclusion of resurfacing hip replacements in this group. Femoral neck fracture is the principal mode of early failure with this particular prosthesis. Loosening is the second most common cause of revision (30.1%). As these are early revisions the most likely cause for loosening is failure to obtain initial fixation. There has been one implant breakage, which was a ceramic femoral head. Infection accounts for 11% of revision procedures. As previously mentioned this does not correspond to the infection rate but is the proportion of earlier revisions that are undertaken for infection (Table H41).

i) Unipolar monoblock prostheses

In the 2002 Report it was indicated that cement fixation might be associated with reduced rates of revision when partial hip replacements were used. In this Report the observed difference in revision rates between cementless Austin Moore prostheses and cemented Thompson prostheses is significant. The cementless Austin Moore prosthesis has a greater rate of revision when compared to the cemented Thompson (Hazard ratio (adjusted for age and sex) = 3.94, 95% CI (2.00, 7.76) p-value <0.001) (Graph H4 and H5).

Additional analysis was undertaken to determine if the interpretation of these results were complicated by patient selection (age, gender, diagnosis) mortality and/or regional variation. The patient groups are matched for age, gender and diagnosis. There is however, significant regional variation. There were no Thompson prostheses replacements performed in Victoria during the data collection period compared to 1560 Austin Moore Prostheses. This contrasts to Queensland and Western Australia where 62.8% and 75.8% respectively of all partial monoblock hip replacements were Thompson prostheses.

The mortality rate for these two groups is identical (Graph M3).

Regional variation has the potential to be the main confounding factor. There is evidence however to suggest that this is not the case. In particular, examination of revision rates for Austin Moore and Thompson prostheses in those states that do sufficient numbers to allow direct comparison of the results, confirms the differences observed using the national data. As such it is unlikely that regional variation is significantly impacting on the observed difference.

ii) Unipolar modular prostheses

The proportion revised for the unipolar modular prostheses is 1.6%. The early revision rates for the five most common unipolar combinations are presented in Table H44. The observed variations are not statistically significant.

iii) Bipolar prostheses

The overall bipolar revision rate is 1.5% for both the percentage revised as well as revisions per 100 observed component years. When comparing the results of the eight most frequently used stem and bipolar prostheses combinations the Omnifit/UHR combination has a significantly greater failure rate when compared to all the other stem/bipolar combinations. There have not however, been any additional failures reported to the Registry during 2002. The log-rank test of difference in survival for the Omnifit/UHR combination obtained a p-value of 0.01 and hazard ratio = 3.5, 95% CI (1.2, 10.3). This difference has been reported in previous AOA NJRR Reports (Table H45).

iv) Primary total hip

The proportion revised for Registry recorded primary total hip replacement is 1.3% and resurfacing procedures at 1.5% (Table H50). These differences are not significant. Thrust plate numbers remain small and the Registry has only recorded one revision.

This year a difference in the early revision rates for cemented, hybrid and cementless hip replacements has become evident. The results for hybrid and cementless primary total hips are similar but both have significantly higher rates of early revision compared to cemented primary total hips. The analysis was undertaken excluding infection as a cause for revision (Graph H6).

Tables H46-48 show the proportion revised and revision rates per 100 observed years for different stem and acetabular component combinations. This is for cemented cementless and hybrid conventional total hip replacements. All combinations were analysed but not included in the presented tables. Those combinations presented represent some of the most commonly used combinations. At this point in time, no significant difference in revision rates for the different types of primary total hip prostheses has been identified, with the exception of the previously reported Inter-Op acetabular component.

Zirconia Femoral Heads

In the 2001 Registry Report the national recall of the Zirconia femoral heads was discussed. Approximately 9000 of these prostheses were implanted in Australia, the vast majority prior to the establishment of the Registry. Last year's Report mentioned that the Registry had recorded one failure.

This year the Registry has seven more femoral head fractures that have been reported making a total eight. Of these eight the Registry does not have the details on the original component for six. It is likely that these were implanted prior to the commencement of the Registry. Most surgeons however have identified clearly on the data collection form that the revision was for a ceramic femoral head fracture. The Registry has complete details on the remaining two. One was an S30 Protek head and the other a Howmedica V40 head. Failure occurred 16 and 6 months respectively after insertion of the components.

Revision to Revision

In the total of 6199 revisions recorded by the Registry there are 482 (7.8%) revisions where the details of the previous revision(s) are recorded. As with Registry recorded primary-to-revision procedures the revisions in this group represent early failures of the previous revisions with one exception. That is revisions that have been undertaken for

infection which often have planned staged multiple revisions. Dislocation remains the most common reason for undertaking a subsequent revision after previous revision surgery (37.1%). Infection is the next most common reason (27.3%). Infection is the most common cause for multiple revisions. One individual has had as many as seven procedures on the same hip.

Femoral Head Size, Demographics and Relationship to Revision for Dislocation

Last year the Registry provided information on the head size of femoral components. The analysis has been repeated this year. The demographic data on head size for primary partial unipolar (monoblock and modular) and outer diameter for bipolar hip prostheses has been repeated with the increased numbers available to us this year. There has been no change in what was reported in 2002 (Graphs H8 an H9)

Femoral head size for conventional primary total hip as well as resurfacing and thrust plate procedures is also reported again (Table H52). There is a slight decrease in the use of the smaller head sizes (22mm 9.4% to 6.9%, and 26mm 21.2% to 17.4%) with a corresponding increase in some of the larger sizes (28mm 60.1% to 63.4% and 32mm 6.7% to 9.6%) (Table H53).

A relationship between head size and subsequent revision for dislocation was also reported. This analysis has again been performed but with a number of differences. As mentioned in the 2002 Report many factors are known to influence the dislocation rate. As larger numbers were available for analysis it was decided to limit the analysis to those patients who had a primary hip replacement for osteoarthritis only. This excludes some of the high-risk diagnoses such as tumour, developmental dysplasia hip (etc). The results of this analysis again confirm the relationship between risk of revision for dislocation and femoral head size (test for trend P= 0.0008) (Table H53).

In addition we also reported that reduced risk of revision for dislocation did not become apparent until 28mm heads were used. This has also been confirmed. There is however one difference in that the rate of revision for dislocation for 26 mm heads is now greater than for 22mm heads. The Exeter stem is the most common stem used when 26 mm heads are also used. The stem however has been combined with 38 different acetabular components. Revision rates vary between combinations and this is likely to be contributing to the increased rate of revision for dislocation observed with this head size. Analysis has also been performed to examine if there is a relationship between revision for other reasons and head size. No such relationship exists (test for trend P= 0.2) (Table H53).

Hip Replacement - 1/9/1999 to 31/12/2002

Table H1: Number of Hip Replacements by sex

Type of hip replacement	*Female*		*Male*		*Total*	
	Number	*%*	*Number*	*%*	*Number*	*%*
Primary Partial Hip	6065	12.9	2048	4.3	8113	17.2
Primary Total Hip	17327	36.8	15509	32.9	32836	69.6
Revision Hip	3357	7.1	2842	6.0	6199	13.1
Total	**26749**	**56.7**	**20399**	**43.3**	**47148**	**100.0**

Note: *percents shown are of 47148*

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 31/12/2002

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

	Female *N=26749 (56.7%)*	***Male*** *N=20399 (43.3%)*	***All Patients*** *N=47148 (100.0%)*
Median	74	69	72
Minimum	14	13	13
Maximum	105	103	105
Mean	71.9	67.4	70.0
Standard Deviation	12.5	12.4	12.6

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

	Female *N=6065 (74.8%)*	***Male*** *N=2048 (25.2%)*	***All Patients*** *N=8113 (100.0%)*
Median	83	81	82
Minimum	22	37	22
Maximum	105	103	105
Mean	81.7	80.3	81.4
Standard Deviation	8.4	9.2	8.6

Graph H1: Age and Sex - Partial Hip Replacement

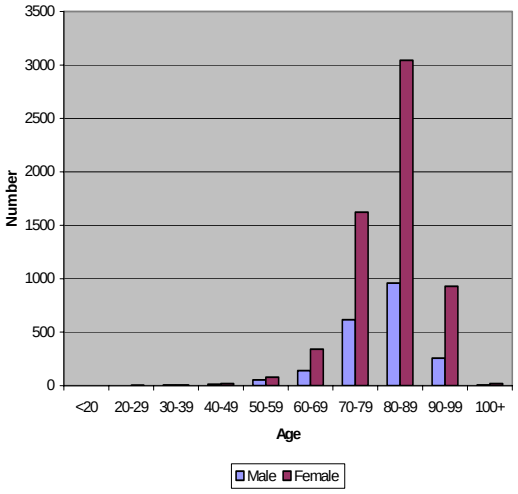


Table H4: Summary statistics of age (by sex) for Primary Total Hip Replacement

	Female *N=17327 (52.8%)*	***Male*** *N=15509 (47.2%)*	***All Patients*** *N=32836 (100.0%)*
Median	71	66	68
Minimum	14	13	13
Maximum	100	100	100
Mean	68.6	65.1	67.0
Standard Deviation	11.9	11.7	11.9

Graph H2: Age and Sex - Primary Hip Replacement

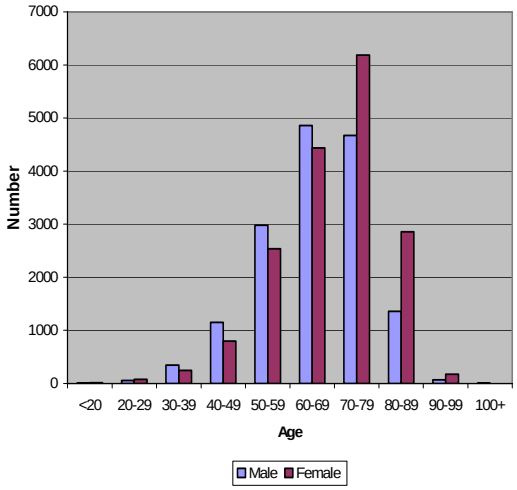


Table H5: Summary statistics of age (by sex) for Revision Hip Replacement

	Female *N=3357 (54.2%)*	***Male*** *N=2842 (45.8%)*	***All Patients*** *N=6199 (100.0%)*
Median	73	72	73
Minimum	22	21	21
Maximum	100	96	100
Mean	71.2	70.1	70.7
Standard Deviation	12.5	11.5	12.1

Graph H3: Age and Sex - Revision Hip Replacement

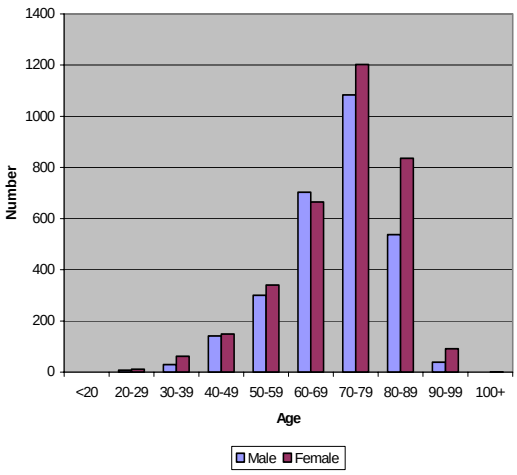


Table H6: Principal Diagnosis - Partial Hip Replacement

Principal Diagnosis	*Number*	*%*
Fractured Neck of Femur	7676	94.6
Osteoarthritis	214	2.6
Tumour	110	1.4
Avascular Necrosis	55	0.7
Failed Internal Fixation	37	0.5
Developmental Dysplasia	16	0.2
Rheumatoid Arthritis	5	0.1
Total	**8113**	**100.0**

Table H7: Principal Diagnosis - Primary Total Hip Replacement

Principal Diagnosis	*Number*	*%*
Osteoarthritis	28877	87.9
Avascular Necrosis	1434	4.4
Fractured Neck of Femur	838	2.6
Rheumatoid Arthritis	601	1.8
Developmental Dysplasia	541	1.6
Other Inflammatory Arthritis	217	0.7
Tumour	173	0.5
Failed Internal Fixation	88	0.3
Arthrodesis Takedown	24	0.1
Fracture/Dislocation	24	0.1
Other	19	0.1
Total	**32836**	**100.0**

Table H8: Diagnosis - Revision Hip Replacement

Diagnosis	*Number*	*%*
Loosening	3661	50.7
Dislocation of Prosthesis	1065	14.8
Lysis	747	10.4
Fracture	576	8.0
Infection	519	7.2
Wear Acetabulum	245	3.4
Pain	122	1.7
Implant Breakage Acetabular	90	1.2
Implant Breakage Stem	50	0.7
Implant Breakage Head	9	0.1
Other	132	1.8
Total	**7216**	**100.0**

Note: *some patients had multiple diagnoses*

Prosthesis Fixation and Usage for Partial Hip Replacement

1/9/1999 to 31/12/2002

Table H9: Prosthesis fixation - Partial Hip Replacement

Fixation	*Unipolar Monoblock*		*Unipolar Modular*		*Bipolar*		*All Patients*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Cemented	1067	13.2	681	8.4	1923	23.7	3671	45.2
Cementless	4124	50.8	92	1.1	226	2.8	4442	54.8
Total	**5191**	**64.0**	**773**	**9.5**	**2149**	**26.5**	**8113**	**100.0**

Table H10(a): Prosthesis Usage - Partial Hip Replacement – Unipolar Monoblock

	Unipolar Monoblock	*Number*	*%*
Cemented	Austin-Moore Type	57	1.1
	Thompson Type	1010	19.5
Cementless	Austin-Moore Type	4023	77.5
	Thompson Type	101	1.9
Total		**5191**	**100.0**

Table H10(b): Prosthesis Usage - Partial Hip Replacement – Unipolar Modular

	Unipolar Modular		*Number*	*%*
	Stem	*Unipolar Head*		
Cemented Stem	Exeter	Unitrax	152	22.3
	CCA	Hemi Head *(Mathys)*	146	21.4
	Spectron EF	Unipolar Head *(S&N)*	118	17.3
		Unitrax	6	0.9
	CPT	Unipolar Type *(Zimmer)*	117	17.2
		Unipolar *(Zimmer)*	2	0.3
	Other (12)	-	140	20.6
Total Cemented			**681**	**100.0**
Cementless Stem	Alloclassic SL	Unipolar Head *(Sulzer)*	65	70.7
		Unipolar Ballhead *(Sulzer)*	7	7.6
	Alloclassic	Unipolar Head (Sulzer)	6	6.5
		Unipolar Ballhead *(Sulzer)*	2	2.2
	Matrix-Opti-Fi	Unipolar Head *(S&N)*	3	3.3
	VerSys	VerSys Endo	3	3.3
	Other (5)	-	6	6.5
Total Cementless			**92**	**100.0**
Total Unipolar			**773**	**100.0**

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

Table H10(c): Prosthesis Usage - Partial Hip Replacement - Bipolar

	Bipolar		***Number***	***%***
	Stem	*Bipolar Prosthesis*		
Cemented Stem	Exeter	UHR	716	37.2
		Centrax	262	13.6
		Other (4)	31	1.6
	Elite Plus	Hastings	167	8.7
		Endo Cup *(Depuy)*	72	3.7
		Other (2)	7	0.4
	Omnifit	UHR	131	6.8
		Centrax	6	0.3
		Other (1)	2	0.1
	Spectron EF	Convene	104	5.4
		Centrax	3	0.2
		Other (1)	2	0.1
	Other (26)		420	21.8
Total Cemented			**1923**	**100.0**
Cementless Stem	Alloclassic SL	Bipolar Ballhead *(Sulzer)*	41	18.1
	ABGII	UHR	25	11.1
		Endo Cup *(Depuy)*	7	3.1
		Other (1)	1	0.4
	Mallory-Head	Centrax	11	4.9
		UHR	7	3.1
		Other (1)	4	1.8
	Stability	Hastings	14	6.2
	Other (24)	-	116	51.3
Total Cementless			**226**	**100.0**
Total			**2149**	**100.0**

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

Table H11: Top Ten Bipolar Prostheses used in Primary Partial Hip Replacement

Bipolar Prosthesis	***Number***	***%***
UHR	936	43.6
Centrax	301	14.0
Hastings	295	13.7
Convene	160	7.4
Endo Cup *(Depuy)*	111	5.2
Ultima	105	4.9
Bipolar Ballhead *(Sulzer)*	82	3.8
Bi-Polar Type *(Zimmer)*	59	2.7
Bipolar Head *(Mathys)*	37	1.7
Bipolar Type *(Biomet)*	25	1.2
Other (7)	38	1.8
Total	**2149**	**100.0**

Prosthesis Fixation and Usage for Primary Total Hip Replacement

1/9/1999 to 31/12/2002

Table H12: Prosthesis Fixation - Primary Total Hip Replacement, by State

Prosthesis Fixation	*Cemented*		*Cementless*		*Hybrid*		*Other*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
ACT/NT	44	7.0	365	58.4	179	28.6	37	5.9	625	100.0
NSW	316	4.5	4036	57.0	2271	32.1	462	6.5	7085	100.0
QLD	2120	40.5	1149	21.9	1805	34.5	162	3.1	5236	100.0
SA	1179	23.7	1521	30.5	1991	40.0	289	5.8	4980	100.0
TAS	173	13.3	937	72.0	183	14.1	8	0.6	1301	100.0
VIC	1703	18.2	3477	37.2	3139	33.6	1028	11.0	9347	100.0
WA	453	10.6	1992	46.7	1602	37.6	215	5.0	4262	100.0
Total	**5988**	**18.2**	**13477**	**41.0**	**11170**	**34.0**	**2201**	**6.7**	**32836**	**100.0**

Note: *other includes resurfacing and thrust plate systems*

Table H13: Prosthesis Usage - Primary Total Hip Replacement where both the Femoral and Acetabular components were Cemented

Femoral Component	*Acetabular Component*	*Number*	*%*
Exeter	Contemporary	1321	22.1
	Exeter	900	15.0
	Elite Plus Ogee	127	2.1
	Other (17)	160	2.7
Charnley	Charnley Ogee	274	4.6
	Charnley	202	3.4
	Charnley LPW	163	2.7
Spectron EF	Reflection	539	9.0
	Apollo	51	0.9
	Elite Plus Ogee	8	0.1
	Other (3)	15	0.3
Elite Plus	Charnley Ogee	148	2.5
	Elite Plus Ogee	106	1.8
	Charnley LPW	75	1.3
	Other (9)	197	3.3
C-Stem	Charnley	170	2.8
	Elite Plus LPW	98	1.6
	Charnley Ogee	90	1.5
	Other (7)	131	2.2
MS 30	Low Profile Cup	330	5.5
	Apollo	71	1.2
	CCB Special Cup	2	0.0
	Other (2)	3	0.1
CPT	ZCA	203	3.4
	Reflection	27	0.5
	Trilogy	2	0.0
	Other (1)	1	0.0
Omnifit	Omnifit	106	1.8
	Contemporary	84	1.4
	Secur-Fit	2	0.0
	Other (2)	2	0.0
CCA	CCB Special Cup	61	1.0
	CCB	13	0.2
	Low Profile Cup	1	0.0
CPCS	Reflection	71	1.2
	Opera	3	0.1
Other (21)	-	231	3.9
Total		**5988**	**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 H14: Prosthesis Usage - Primary Total Hip Replacement where the Femoral and Acetabular components were Cementless

Femoral Component	*Acetabular Component*	*Number*	*%*
ABGII	ABGII	1187	8.8
	Trident	206	1.5
	Option	61	0.5
	Other (6)	69	0.5
Synergy	Reflection	1182	8.8
	Trident	6	0.0
	Mallory-Head	5	0.0
	Other (5)	6	0.0
Alloclassic SL	Allofit	540	4.0
	Fitmore	281	2.1
	Morscher	223	1.7
	Other (8)	144	1.1
Secur-Fit Plus	Trident	970	7.2
	Secur-Fit	100	0.7
	Omnifit	39	0.3
	Other (7)	16	0.1
Secur-Fit	Trident	724	5.4
	Secur-Fit	85	0.6
	Omnifit	59	0.4
	Other (1)	5	0.0
VerSys	Trilogy	781	5.8
	Duraloc	24	0.2
	Hedrocel	9	0.1
	Other (2)	3	0.0
Omnifit	Trident	443	3.3
	Secur-Fit	298	2.2
	Trilogy	30	0.2
	Other (2)	27	0.2
S-Rom	Option	275	2.0
	S-Rom	147	1.1
	Duraloc	92	0.7
	Other (16)	237	1.8
Mallory-Head	Mallory-Head	663	4.9
	M2a	5	0.0
	Bihapro	3	0.0
	Other (2)	4	0.0
CLS	Fitmore	231	1.7
	CLS	151	1.1
	Allofit	127	0.9
	Other (8)	33	0.2
Other (57)	-	3986	29.6
Total		**13477**	**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 H15: 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	Vitalock	1841	16.6
	Trident	1248	11.3
	ABGII	602	5.4
	Other (15)	938	8.5
Spectron EF	Reflection	1144	10.3
	ABGII	23	0.2
	Duraloc	17	0.2
	Other (8)	34	0.3
Elite Plus	Duraloc	720	6.5
	Mallory-Head	98	0.9
	Trident	82	0.7
	Other (13)	157	1.4
CPT	Trilogy	692	6.3
	S-Rom	32	0.3
	Reflection	8	0.1
	Other (3)	4	0.0
Omnifit	Trident	465	4.2
	Secur-Fit	218	2.0
	Trilogy	34	0.3
	Other (4)	7	0.1
MS 30	Fitmore	232	2.1
	Allofit	149	1.3
	Trilogy	44	0.4
	Other (12)	66	0.6
Definition	Vitalock	299	2.7
	Trident	96	0.9
	ABGII	21	0.2
	Other (2)	2	0.0
C-Stem	Duraloc	287	2.6
	Option	39	0.4
	RM Cup Ceros	19	0.2
	Other (5)	11	0.1
Charnley	Vitalock	231	2.1
	Duraloc	103	0.9
	Secur-Fit	1	0.0
VerSys	Trilogy	250	2.3
	Hedrocel	3	0.0
	Mallory-Head	2	0.0
	Other (2)	2	0.0
Other (39)	-	849	7.7
Total		**11070**	**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 - 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	11	11.0
	Other (7)	7	7.0
Corail	Elite Plus LPW	9	9.0
	Other (3)	4	4.0
S-Rom	Elite Plus LPW	2	2.0
	Other (9)	10	10.0
ABGII	Contemporary	3	3.0
	Other (2)	2	2.0
CLS	Fitmore	2	2.0
	Other (3)	3	3.0
Mallory-Head	Mallory-Head	2	2.0
	Other (2)	2	2.0
	Artek	2	2.0
Natural Hip	Other (2)	2	2.0
CBC Stem	CBF Cup	3	3.0
Margron	Elite Plus LPW	2	2.0
	Other (1)	1	1.0
Secur-Fit	Contemporary	2	2.0
	Other (1)	1	1.0
Other (23)	-	30	30.0
Total		**100**	**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 Cementless and the Acetabular component was Cemented, Top ten combinations

Femoral Component	*Acetabular Component*	*Number*	*%*
Alloclassic SL	Apollo	11	11.0
Corail	Elite Plus LPW	9	9.0
ABGII	Contemporary	3	3.0
CBC Stem	CBF Cup	3	3.0
CLS	Fitmore	2	2.0
Citation	Vitalock	2	2.0
Corail	Duraloc	2	2.0
Exeter	Contemporary	2	2.0
Mallory-Head	Mallory-Head	2	2.0
Margron	Elite Plus LPW	2	2.0
Other (56)	-	62	62.0
Total		**100**	**100.0**

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

Table H18 (a): Other types of Primary Hip Replacements – Resurfacing Head

Resurfacing Head	*Cup*	*Number*	*%*
BHR	BHR	2043	95.9
Cormet 2000	Cormet 2000	77	3.6
Conserve Plus	Conserve Plus	8	0.4
Conserve	-	2	0.1
Total Resurfacing		**2130**	**100.0**

Note: *2 conserves were inserted without cups*

Table H18 (b): Other types of Primary Hip Replacements – Thrust Plate

Thrust Plate	*Shell/Cup*	*Number*	*%*
TPP	Fitmore	61	85.9
	Artek	5	7.0
	Allofit	5	7.0
Total Thrust Plate		**71**	**100.0**

Top Ten Femoral and Acetabular Components used for Primary Total Hip Replacement - 1/9/1999 to 31/12/2002

Table H19: Top Ten Cemented Femoral components used in Primary Total Hip Replacement

Femoral Component	*Number*	*%*
Exeter	7137	37.2
BHR	2043	10.7
Spectron EF	1831	9.6
Elite Plus	1583	8.3
Charnley	974	5.1
CPT	969	5.1
Omnifit	918	4.8
MS 30	897	4.7
C-Stem	845	4.4
Definition	462	2.4
Other (46)	1512	7.9
Total	**19171**	**100.0**

Note: *includes resurfacing components and thrust plates*

Table H20: Top Ten Cementless Femoral components used in Primary Total Hip Replacement

Femoral Component	*Number*	*%*
ABGII	1528	11.2
Alloclassic SL	1206	8.8
Synergy	1201	8.8
Secur-Fit Plus	1127	8.2
Secur-Fit	876	6.4
VerSys	818	6.0
Omnifit	800	5.9
S-Rom	763	5.6
Mallory-Head	679	5.0
CLS	547	4.0
Other (62)	4120	30.2
Total	**13665**	**100.0**

Note: *includes resurfacing components and thrust plates*

Table H21: Top Ten Femoral components used in Primary Total Hip Replacement

Femoral Component		*Number*	*%*
Exeter	*cemented*	7137	21.7
BHR	*cemented*	2043	6.2
Spectron EF	*cemented*	1831	5.6
Elite Plus	*cemented*	1583	4.8
ABGII	*cementless*	1528	4.7
Alloclassic SL	*cementless*	1206	3.7
Synergy	*cementless*	1201	3.7
Secur-Fit Plus	*cementless*	1127	3.4
Charnley	*cemented*	974	3.0
CPT	*cemented*	969	3.0
Other (118)		13237	40.3
Total		**32836**	**100.0**

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

Acetabular Component	*Number*	*%*
Contemporary	1444	23.7
Exeter	919	15.1
Reflection	665	10.9
Charnley Ogee	515	8.5
Charnley	449	7.4
Low Profile Cup *(Sulzer)*	350	5.7
Elite Plus Ogee	344	5.7
Charnley LPW	246	4.0
ZCA	232	3.8
Apollo	213	3.5
Other (37)	711	11.7
Total	**6088**	**100.0**

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

Acetabular Component	*Number*	*%*
Trident	4660	17.4
Vitalock	2933	11.0
Reflection	2681	10.0
Trilogy	2096	7.8
Duraloc	2095	7.8
BHR	2076	7.8
ABGII	2027	7.6
Mallory-Head	1740	6.5
Fitmore	1182	4.4
Allofit	1023	3.8
Other (48)	4235	15.8
Total	**26748**	**100.0**

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

Acetabular Component		*Number*	*%*
Trident	*cementless*	4660	14.2
Vitalock	*cementless*	2933	8.9
Reflection	*cementless*	2681	8.2
Trilogy	*cementless*	2096	6.4
Duraloc	*cementless*	2095	6.4
BHR	*cementless*	2076	6.3
ABGII	*cementless*	2027	6.2
Mallory-Head	*cementless*	1740	5.3
Contemporary	*cemented*	1444	4.4
Fitmore	*cementless*	1182	3.6
Other (95)		9902	30.2
Total		**32836**	**100.0**

Prosthesis Fixation and Usage for Revision Hip Replacement

1/9/1999 to 31/12/2002

Table H25: Components Used - Major Revision Hip

Component Used	*Number*	*%*
Femoral and Acetabular	2117	39.6
Acetabular Component Only	1853	34.6
Femoral Component Only	1114	20.8
Cement Spacer	98	1.8
Removal Prosthesis	90	1.7
Bipolar Head & Femoral Comp	76	1.4
Total	**5348**	**100.0**

Table H26: Components Used - Minor Revision Hip

Component Used	*Number*	*%*
Head/Insert	594	69.8
Head Only	118	13.9
Cable/Other Minor Components	67	7.9
Insert only	56	6.6
Bipolar Head Only	14	1.6
Locking Ring only	2	0.2
Total	**851**	**100.0**

Table H27: Prosthesis Fixation - Major Revision Hip Replacement

Component Used	*Cementless*		*Cemented*		*Hybrid*		*N/A*		*Total*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Femoral Component Only	735	13.9	379	7.2	-	-	-	-	1114	21.1
Acetabular Component Only	1268	24.1	585	11.1	-	-	-	-	1853	35.1
Femoral and Acetabular	992	18.8	514	9.7	611	11.6	-	-	2117	40.2
Prostheses not reinserted	-	-	-	-	-	-	188	3.6	188	3.6
Total	**2995**	**56.8**	**1478**	**28.0**	**611**	**11.6**	**188**	**3.6**	**5272**	**100.0**

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

Table H28: Prosthesis Fixation - Bipolar - Major Revision Hip Replacement

Component Used	*Cementless Stem*		*Cemented Stem*		*Total*	
	Number	*%*	*Number*	*%*	*Number*	*%*
Bipolar head and Stem	17	22.4	59	77.6	76	100.0
Total	**17**	**22.4**	**59**	**77.6**	**76**	**100.0**

Table H29: Prosthesis Usage - Bipolar - Major Revision Hip Replacement

Femoral Component	*Bipolar*	*Number*	*%*
Exeter	UHR	24	31.6
	Centrax	15	19.7
	Hastings	1	1.3
Charnley	Hastings	6	7.9
HNR	UHR	3	3.9
Mallory-Head	Bipolar Type (Biomet)	2	2.6
	Centrax	1	1.3
Omnifit	UHR	2	2.6
	Centrax	1	1.3
S-Rom	Hastings	3	3.9
ZMR	Bipolar Type (Zimmer)	2	2.6
	UHR	1	1.3
Restoration	UHR	2	2.6
VerSys	Bipolar Type (Zimmer)	2	2.6
Other (11)	-	11	14.5
Total		**76**	**100.0**

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

Table H30: Prosthesis Usage - Cemented Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral Only	Exeter	-	133	9.0
	Elite Plus	-	39	2.6
	Spectron EF	-	35	2.4
	CPT	-	29	2.0
	Charnley	-	26	1.8
	Other (31)	-	117	7.9
Acetabular Only	-	Contemporary	108	7.3
	-	Reflection	93	6.3
	-	Exeter	53	3.6
	-	Omnifit	32	2.2
	-	Elite Plus Ogee	30	2.0
	-	Other (37)	269	18.2
Femoral & Acetabular	Exeter	Contemporary	146	9.9
	Exeter	Exeter	74	5.0
	Spectron EF	Reflection	28	1.9
	Elite Plus	Elite Plus Ogee	17	1.2
	Charnley	Charnley	15	1.0
	Other (88)	Other	234	15.8
Total			**1478**	**100.0**

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

Table H31: Prosthesis Usage - Cementless Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral Only	S-Rom	-	181	6.0
	ZMR	-	101	3.4
	Restoration	-	89	3.0
	Solution	-	55	1.8
	Mallory-Head	-	47	1.6
	Other (38)	-	262	8.7
Acetabular Only	-	Trident	212	7.1
	-	Secur-Fit	200	6.7
	-	Trilogy	164	5.5
	-	Mallory-Head	123	4.1
	-	Duraloc	110	3.7
	-	Other (33)	459	15.3
Femoral & Acetabular	ZMR	Trilogy	105	3.5
	Restoration	Trident	79	2.6
	Mallory-Head	Mallory-Head	58	1.9
	S-Rom	Duraloc	50	1.7
	Revision Hip	SPH-Blind	47	1.6
	Other (155)	Other	653	21.8
Total			**2995**	**100.0**

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

Table H32: Prosthesis Usage - Hybrid (stem cemented) Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral & Acetabular	Exeter	Vitalock	66	14.8
	CPT	Trilogy	49	11.0
	Exeter	Trident	48	10.8
	Spectron EF	Reflection	32	7.2
	Exeter	Secur-Fit	30	6.7
	Other (69)	Other	221	49.6
Total			**446**	**100.0**

Table H33: Prosthesis Usage - Hybrid (cup cemented) Major Revision Hip Replacement

Type of revision	*Femoral Component*	*Acetabular Component*	*Number*	*%*
Femoral & Acetabular	S-Rom	Contemporary	11	6.7
	ZMR	ZCA	10	6.1
	Restoration T3	Contemporary	9	5.5
	Revision Hip	Mueller	8	4.8
	Echelon	Reflection	6	3.6
	Other (64)	Other	121	73.3
Total			**165**	**100.0**

Top Ten Femoral and Acetabular Components used for Revision Hip Replacement - 1/9/1999 to 31/12/2002

Table H34: Top Ten Cemented Stem components used in Revision Hip Replacement

Cemented Stems	*Number*	*%*
Exeter	641	45.9
Spectron EF	118	8.4
Elite Plus	99	7.1
CPT	95	6.8
Omnifit	70	5.0
Charnley	68	4.9
C-Stem	43	3.1
MS 30	38	2.7
VerSys	24	1.7
Freeman	18	1.3
Other (38)	184	13.2
Total	**1398**	**100.0**

Table H35: Top Ten Cementless Stem components used in Revision Hip Replacement

Cementless Stems	*Number*	*%*
S-Rom	468	24.5
ZMR	256	13.4
Restoration	237	12.4
Mallory-Head	132	6.9
Revision Hip	118	6.2
PFM-R	110	5.8
Solution	102	5.3
Echelon	94	4.9
Restoration T3	52	2.7
Other (45)	340	17.8
Total	**1909**	**100.0**

Table H36: Top Ten Cemented Acetabular components used in Revision Hip Replacement

Cemented Acetabular	*Number*	*%*
Contemporary	308	24.4
Reflection	158	12.5
Exeter	142	11.2
Elite Plus Ogee	76	6.0
Low Profile Cup	57	4.5
Omnifit	55	4.4
Charnley	52	4.1
ZCA	51	4.0
Charnley Ogee	35	2.8
Brunswick	33	2.6
Other (37)	297	23.5
Total	**1264**	**100.0**

Table H37: Top Ten Cementless Acetabular components used in Revision Hip Replacement

Cementless Acetabular	*Number*	*%*
Trident	443	16.4
Trilogy	372	13.7
Secur-Fit	352	13.0
Duraloc	243	9.0
Mallory-Head	242	8.9
Reflection	215	7.9
Vitalock	215	7.9
Omnifit	102	3.8
SPH-Blind	90	3.3
ABGII	67	2.5
Other (34)	365	13.5
Total	**2706**	**100.0**

Table H38: Prosthesis Usage - Minor Revision Hip Replacement Ten most common inserts used

Insert	*Number*	*%*
HGPII	85	13.1
Duraloc	71	10.9
PCA	61	9.4
Constrained Insert (Osteonics)	60	9.2
Omnifit	49	7.5
Reflection	48	7.4
Mallory-Head	46	7.1
Trident	39	6.0
Longevity	36	5.5
Ringloc	21	3.2
Other (20)	134	20.6
Total	**650**	**100.0**

Table H39: 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	1	0.0	1	0.0	4	0.2	7	0.3	14	0.7
	Unipolar Mono	-	-	-	-	1	0.0	1	0.0	3	0.1	5	0.2
	Unipolar Modular	-	-	-	-	-	-	-	-	4	0.2	4	0.2
	Total Hip	-	-	-	-	1	0.0	2	0.1	4	0.2	7	0.3
Unipolar Mono	Unipolar Mono	2	0.1	4	0.2	7	0.3	28	1.4	26	1.3	67	3.2
	Unipolar Modular	-	-	-	-	-	-	5	0.2	2	0.1	7	0.3
	Total Hip	-	-	-	-	-	-	3	0.1	1	0.0	4	0.2
Unipolar Modular	Bipolar	-	-	-	-	-	-	3	0.1	-	-	3	0.1
	Unipolar Mono	-	-	-	-	1	0.0	-	-	-	-	1	0.0
	Unipolar Modular	-	-	-	-	-	-	4	0.2	4	0.2	8	0.4
	Total Hip	-	-	-	-	-	-	1	0.0	-	-	1	0.0
Resurfacing	Resurfacing	46	2.2	3	0.1	-	-	53	2.6	47	2.3	149	7.2
	Total Hip	-	-	-	-	-	-	1	0.0	3	0.1	4	0.2
Thrust Plate	Thrust Plate	-	-	-	-	-	-	3	0.1	5	0.2	8	0.4
Total Hip	Bipolar	1	0.0	-	-	1	0.0	3	0.1	3	0.1	8	0.4
	Unipolar Mono	-	-	-	-	-	-	1	0.0	4	0.2	5	0.2
	Unipolar Modular	-	-	-	-	-	-	-	-	1	0.0	1	0.0
	Resurfacing	2	0.1	-	-	-	-	1	0.0	8	0.4	11	0.5
	Total Hip	104	5.0	26	1.3	26	1.3	731	35.3	875	42.3	1762	85.2
Total		**156**	**7.5**	**34**	**1.6**	**38**	**1.8**	**844**	**40.8**	**997**	**48.2**	**2069**	**100.0**

Registry Recorded Primary to Revision Hip Replacement

1/9/1999 to 31/12/2002

Table H40: Days to Revision by Primary procedure type

Primary Procedure (N)		***Days to Revision Procedure***										***Total***		***% revised***
		Same Day		*<2 weeks*		*2-6 weeks*		*6 weeks - 1 year*		*>1 year*				
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%**	*%*
Bipolar	(2149)	-	-	3	0.5	11	1.8	15	2.5	4	0.7	33	5.4	1.5
Unipolar Monoblock	(5191)	2	0.3	7	1.2	26	4.3	78	12.9	22	3.6	135	22.2	2.6
Unipolar Modular	(773)	-	-	2	0.3	4	0.7	7	1.2	-	-	13	2.1	1.7
Total Hip	(30635)	3	0.5	47	7.7	80	13.2	203	33.4	61	10.0	394	64.9	1.3
Resurfacing Hip	(2130)	-	-	2	0.3	6	1.0	21	3.5	2	0.3	31	5.1	1.5
Thrust Plate	(71)	-	-	1	0.2	-	-	-	-	-	-	1	0.2	1.4
Total	**(40949)**	**5**	**0.8**	**62**	**10.2**	**127**	**20.9**	**324**	**53.4**	**89**	**14.7**	**607**	**100.0**	**1.5**

Table H41: 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	2	0.3	27	4.1	63	9.7	96	14.7	23	3.5	211	32.4
Fracture	1	0.2	16	2.5	35	5.4	68	10.4	5	0.8	125	19.2
Implant Breakage Head	-	-	-	-	-	-	-	-	1	0.2	1	0.2
Infection	-	-	-	-	12	1.8	46	7.1	14	2.1	72	11.0
Loosening	-	-	15	2.3	21	3.2	121	18.6	39	6.0	196	30.1
Lysis	-	-	-	-	1	0.2	8	1.2	4	0.6	13	2.0
Pain	-	-	-	-	2	0.3	4	0.6	4	0.6	10	1.5
Wear Acetabulum	-	-	-	-	-	-	1	0.2	-	-	1	0.2
Other	2	0.3	7	1.1	2	0.3	7	1.1	5	0.8	23	3.5
Total	**5**	**0.8**	**65**	**10.0**	**136**	**20.9**	**351**	**53.8**	**95**	**14.6**	**652**	**100**

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

Table H42: Primary to Revision procedure types

Primary	*Revision*	*Number*	*%*
Bipolar	Femoral Component Only	3	0.5
	Acetabular Component Only	17	2.8
	Femoral and Acetabular	2	0.3
	Removal Prosthesis	1	0.2
	Bipolar head & Femoral Comp	4	0.7
	Bipolar Head Only	6	1.0
Unipolar Monoblock	Femoral Component Only	18	3.0
	Femoral and Acetabular	80	13.2
	Removal Prosthesis	4	0.7
	Cement Spacer	5	0.8
	Bipolar head & Femoral Comp	25	4.1
	Cable/Other Minor	3	0.5
Unipolar Modular	Femoral Component Only	3	0.5
	Acetabular Component Only	6	1.0
	Femoral and Acetabular	1	0.2
	Removal Prosthesis	1	0.2
	Cement Spacer	1	0.2
	Cable/Other Minor	1	0.2
Total Hip	Femoral Component Only	95	15.7
	Acetabular Component Only	121	19.9
	Femoral and Acetabular	29	4.8
	Removal Prosthesis	5	0.8
	Cable and Cement	1	0.2
	Cement Spacer	11	1.8
	Bipolar Head Only	1	0.2
	Head/Insert	78	12.9
	Insert only	5	0.8
	Head Only	36	5.9
	Cable/Other Minor	12	2.0
Resurfacing Hip System	Femoral Component Only	23	3.8
	Acetabular Component Only	3	0.5
	Femoral and Acetabular	5	0.8
Thrust Plate	Acetabular Component Only	1	0.2
Total		**607**	**100.0**

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

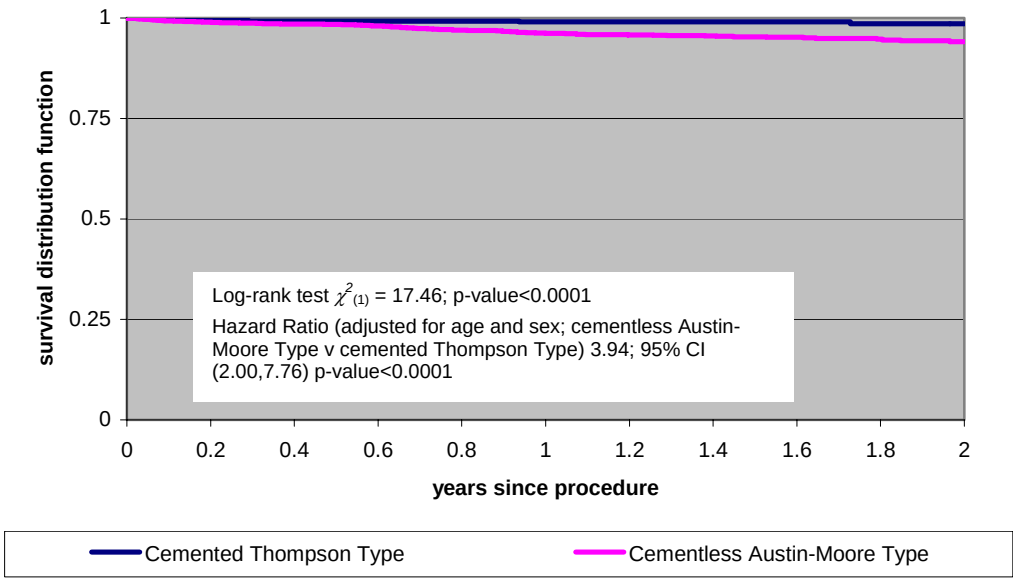
Components used in the Primary Procedures that were Revised

Table H43: 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	122	4023	3.0	3628	3.4	(2.79, 4.02)
Austin-Moore Type Cemented	0	57	0.0	43	0.0	(0.00, 8.67)
Thompson Type Cementless	4	101	4.0	111	3.6	(0.98, 9.24)
Thompson Type Cemented	9	1010	0.9	1032	0.9	(0.40, 1.65)
Total	**135**	**5191**[†]	**2.6**	**4813**	**2.8**	**(2.35, 3.32)**

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

Graph H4: Kaplan-Meier Survival of Austin Moore - cementless v Thompson - cemented



	Number at risk at start of the period				
	0	*0.5*	*1*	*1.5*	*2*
Cemented Thompson type	1010	684	449	278	148
Cementless Austin Moore type	4023	2547	1447	796	365

Graph H5: Cumulative percentage of Revision of Austin Moore and Thompson Hip Prostheses

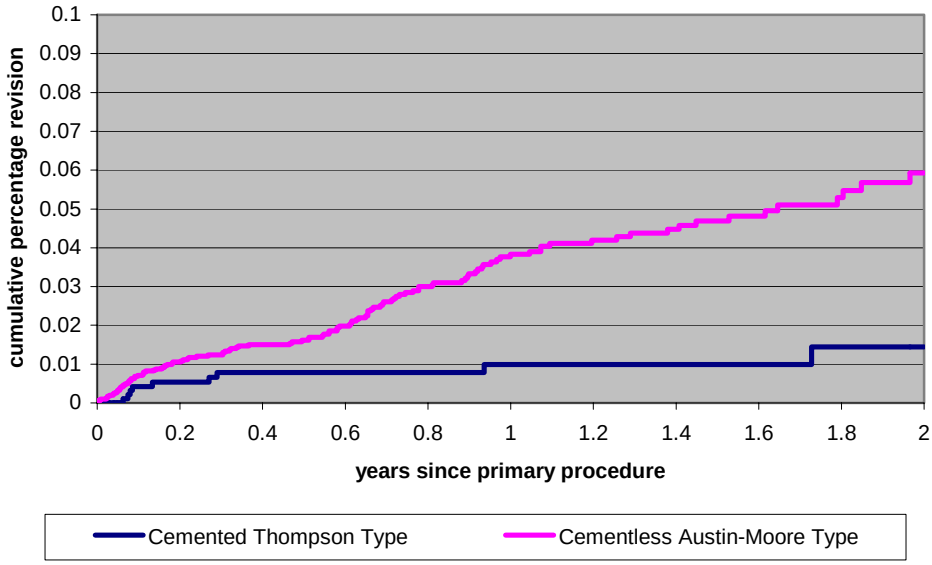


Table H44: Primary Unipolar Modular Procedures requiring Revision

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)*	1	65	1.5	40	2.5	(0.06, 13.95)
CCA	Hemi Head *(Mathys)*	2	147	1.4	181	1.1	(0.13, 4.00)
CPT	Unipolar *(Zimmer)*	1	117	0.9	127	0.8	(0.02, 4.39)
Exeter	Unitrax	2	152	1.3	102	2.0	(0.24, 7.06)
Spectron EF	Unipolar Head *(S&N)*	4	119	3.4	130	3.1	(0.84, 7.85)
Other (22 combs)	-	3	173	1.7	133	2.2	(0.46, 6.57)
Total		**13**	**773**[†]	**1.7**	**713**	**1.8**	**(0.97, 3.12)**

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

Table H45: 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*
C-Stem	Hastings	1	64	1.6	61	1.6	(0.04, 9.17)
Elite Plus	Endo Cup *(Depuy)*	0	72	0.0	36	0.0	(0.00, 10.11)
Elite Plus	Hastings	4	167	2.4	183	2.2	(0.59, 5.59)
Exeter	Centrax	4	262	1.5	410	1.0	(0.27, 2.50)
Exeter	UHR	6	718	0.8	505	1.2	(0.44, 2.59)
Omnifit	UHR	6	142	4.2	155	3.9	(1.42, 8.41)
Spectron EF	Convene	0	104	0.0	92	0.0	(0.00, 3.99)
Thompson Modular	Ultima	0	102	0.0	128	0.0	(0.00, 2.87)
Other (75 combs)	-	12	518	2.3	376	3.2	(1.65, 5.58)
Total		**33**	**2149**[†]	**1.5**	**1947**	**1.7**	**(1.17, 2.38)**

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 H46: 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	5	170	2.9	195	2.6	(0.83, 5.99)
	Charnley Ogee	0	90	0.0	86	0.0	(0.00, 4.28)
	Elite Plus LPW	0	98	0.0	45	0.0	(0.00, 8.29)
	Elite Plus Ogee	0	87	0.0	95	0.0	(0.00, 3.87)
CCA	CCB Special Cup	1	61	1.6	83	1.2	(0.03, 6.70)
CPCS	Reflection	1	71	1.4	30	3.3	(0.08, 18.32)
CPT	ZCA	2	203	1.0	271	0.7	(0.09, 2.66)
Charnley	Charnley	2	202	1.0	236	0.8	(0.10, 3.06)
	Charnley LPW	2	163	1.2	246	0.8	(0.10, 2.94)
	Charnley Ogee	3	274	1.1	329	0.9	(0.19, 2.66)
Elite Plus	Charnley	0	71	0.0	94	0.0	(0.00, 3.94)
	Charnley LPW	2	75	2.7	96	2.1	(0.25, 7.56)
	Charnley Ogee	1	148	0.7	187	0.5	(0.01, 2.98)
	Elite Plus LPW	0	54	0.0	58	0.0	(0.00, 6.34)
	Elite Plus Ogee	1	106	0.9	136	0.7	(0.02, 4.10)
Exeter	Contemporary	21	1321	1.6	1435	1.5	(0.91, 2.24)
	Elite Plus Ogee	0	127	0.0	159	0.0	(0.00, 2.32)
	Exeter	7	900	0.8	1146	0.6	(0.25, 1.26)
MS 30	Apollo	1	71	1.4	74	1.4	(0.03, 7.56)
	Low Profile Cup	1	330	0.3	519	0.2	(0.00, 1.07)
Omnifit	Contemporary	1	84	1.2	95	1.1	(0.03, 5.86)
	Omnifit	2	106	1.9	225	0.9	(0.11, 3.21)
Spectron EF	Apollo	0	51	0.0	100	0.0	(0.00, 3.69)
	Reflection	0	539	0.0	628	0.0	(0.00, 0.59)
Other (89 combs)	-	5	586	0.9	651	0.8	(0.25, 1.79)
Total		**58**	**5988**	**1.0**	**7219**	**0.8**	**(0.61, 1.04)**

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

Table H47: 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	16	1187	1.3	1030	1.6	(0.89, 2.52)
	Option	0	61	0.0	32	0.0	(0.00, 11.59)
	Trident	3	206	1.5	114	2.6	(0.54, 7.69)
	Vitalock	2	50	4.0	35	5.8	(0.70, 20.85)
Accolade	Trident	1	139	0.7	101	1.0	(0.02, 5.50)
Alloclassic SL	Allofit	4	540	0.7	503	0.8	(0.22, 2.04)
	Artek	3	64	4.7	85	3.5	(0.73, 10.30)
	Fitmore	3	281	1.1	249	1.2	(0.25, 3.52)
	Mallory-Head	1	68	1.5	60	1.7	(0.04, 9.32)
	Morscher	1	223	0.4	197	0.5	(0.01, 2.83)
CBC Stem	CBF Cup	0	137	0.0	166	0.0	(0.00, 2.22)
CLS	Allofit	2	127	1.6	89	2.2	(0.27, 8.09)
	CLS	1	151	0.7	255	0.4	(0.01, 2.19)
	Fitmore	1	231	0.4	235	0.4	(0.01, 2.37)
Citation	Trident	1	117	0.9	106	0.9	(0.02, 5.26)
	Vitalock	4	284	1.4	330	1.2	(0.33, 3.10)
Corail	Duraloc	1	182	0.5	114	0.9	(0.02, 4.87)
	Option	1	147	0.7	113	0.9	(0.02, 4.92)
F2L Multineck	SPH-Blind	3	271	1.1	247	1.2	(0.25, 3.56)
MBA	Tetras	0	55	0.0	48	0.0	(0.00, 7.74)
Mallory-Head	Mallory-Head	9	663	1.4	1030	0.9	(0.40, 1.66)
Margron	Transcend	7	140	5.0	135	5.2	(2.08, 10.67)
Meridian	ABGII	0	85	0.0	59	0.0	(0.00, 6.26)
	Vitalock	2	176	1.1	200	1.0	(0.12, 3.61)
Natural Hip	Allofit	2	70	2.9	73	2.7	(0.33, 9.91)
	Fitmore	2	287	0.7	269	0.7	(0.09, 2.69)
Omnifit	Secur-Fit	7	298	2.3	362	1.9	(0.78, 3.98)
	Trident	5	443	1.1	488	1.0	(0.33, 2.39)
Primaloc	Duraloc	0	56	0.0	43	0.0	(0.00, 8.54)
S-Rom	Duraloc	2	92	2.2	147	1.4	(0.16, 4.90)
	Option	3	275	1.1	307	1.0	(0.20, 2.85)
	S-Rom	2	147	1.4	164	1.2	(0.15, 4.42)
	Transcend	0	55	0.0	31	0.0	(0.00, 11.94)
Secur-Fit	Omnifit	1	59	1.7	85	1.2	(0.03, 6.58)
	Secur-Fit	1	85	1.2	139	0.7	(0.02, 4.02)
	Trident	13	724	1.8	667	1.9	(1.04, 3.33)
Secur-Fit Plus	Secur-Fit	2	100	2.0	85	2.3	(0.28, 8.46)
	Trident	8	970	0.8	984	0.8	(0.35, 1.60)
Stability	ABGII	1	64	1.6	83	1.2	(0.03, 6.72)
	Duraloc	2	220	0.9	243	0.8	(0.10, 2.97)
Summit	Duraloc	1	53	1.9	19	5.3	(0.13, 29.55)
Synergy	Reflection	20	1182	1.7	1073	1.9	(1.14, 2.88)
Taperloc	Mallory-Head	3	202	1.5	190	1.6	(0.32, 4.60)
Uni-Rom	Duraloc	0	60	0.0	111	0.0	(0.00, 3.32)
	Trilogy	0	62	0.0	52	0.0	(0.00, 7.13)
VerSys	Trilogy	9	781	1.2	673	1.3	(0.61, 2.54)
Other (211 combs)	-	30	1607	1.9	1555	1.9	(1.30, 2.75)
Total		**180**	**13477**	**1.3**	**13377**	**1.3**	**(1.16, 1.56)**

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

Table H48: Hybrid - Primary Total Hip where the Femoral component was Cemented and the Acetabular component was Cementless requiring Revision

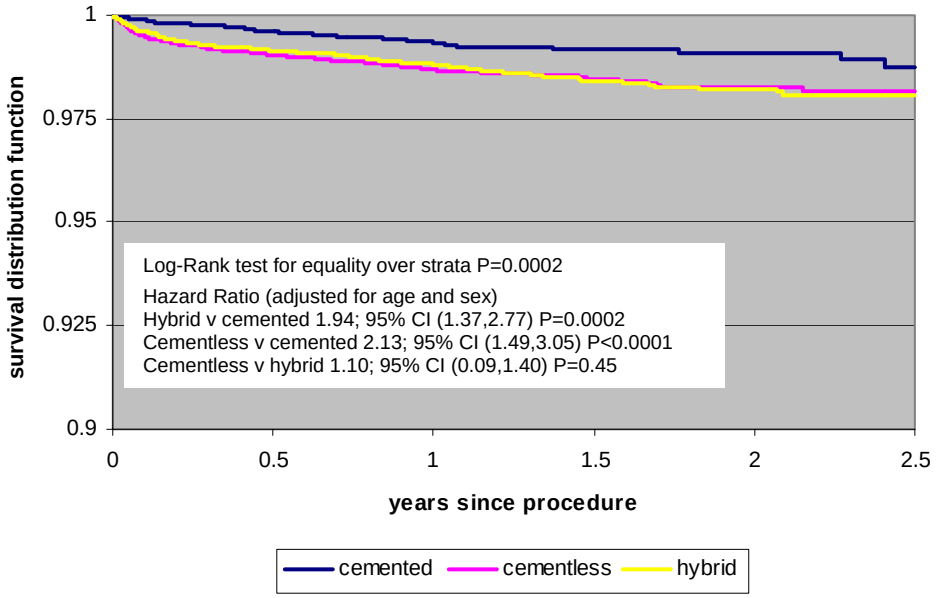
Femoral Component	*Acetabular Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
C-Stem	Duraloc	6	287	2.1	296	2.0	(0.74, 4.41)
CPCS	Reflection	0	130	0.0	81	0.0	(0.00, 4.55)
CPT	Trilogy	11	692	1.6	662	1.7	(0.83, 2.97)
Charnley	Duraloc	1	103	1.0	116	0.9	(0.02, 4.81)
Charnley	Vitalock	4	231	1.7	297	1.3	(0.37, 3.45)
Definition	Trident	0	96	0.0	140	0.0	(0.00, 2.63)
Definition	Vitalock	0	299	0.0	506	0.0	(0.00, 0.73)
Elite Plus	Duraloc	9	720	1.3	788	1.1	(0.52, 2.17)
Elite Plus	Mallory-Head	1	98	1.0	120	0.8	(0.02, 4.64)
Elite Plus	Trident	0	82	0.0	67	0.0	(0.00, 5.53)
Exeter	ABGII	4	602	0.7	552	0.7	(0.20, 1.85)
Exeter	Duraloc	1	189	0.5	208	0.5	(0.01, 2.67)
Exeter	Mallory-Head	1	362	0.3	350	0.3	(0.01, 1.59)
Exeter	Reflection	3	96	3.1	73	4.1	(0.85, 12.05)
Exeter	Secur-Fit	4	142	2.8	175	2.3	(0.62, 5.84)
Exeter	Trident	19	1248	1.5	898	2.1	(1.27, 3.30)
Exeter	Trilogy	2	58	3.4	44	4.5	(0.55, 16.30)
Exeter	Vitalock	30	1841	1.6	2505	1.2	(0.81, 1.71)
Freeman	Mallory-Head	4	178	2.2	252	1.6	(0.43, 4.06)
Friendly Hip	SPH-Blind	1	50	2.0	42	2.4	(0.06, 13.34)
Lubinus SP II	C.F.P.	1	68	1.5	52	1.9	(0.05, 10.63)
MS 30	Allofit	1	149	0.7	125	0.8	(0.02, 4.45)
MS 30	Fitmore	0	232	0.0	280	0.0	(0.00, 1.32)
Omnifit	Secur-Fit	3	218	1.4	323	0.9	(0.19, 2.72)
Omnifit	Trident	12	465	2.6	493	2.4	(1.26, 4.25)
Spectron EF	Reflection	19	1144	1.7	1347	1.4	(0.85, 2.20)
VerSys	Trilogy	1	250	0.4	236	0.4	(0.01, 2.36)
Other (132 combs)	-	17	1040	1.6	1103	1.5	(0.90, 2.47)
Total	**-**	**155**	**11070**	**1.4**	**12132**	**1.3**	**(1.08, 1.50)**

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

Table H49: 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*
Others	-	1	100	1.0	103	1.0	(0.02, 5.42)
Total	**-**	**1**	**100**	**1.0**	**103**	**1.0**	**(0.02, 5.42)**

Graph H6: Kaplan-Meier Survival - Total Hip Replacement by cement status excluding infection



	Number at risk at start of the period				
	0	***0.5***	***1***	***1.5***	***2***
Cementless	13459	9458	5858	3113	1346
Cemented	5970	4659	3297	2064	1012
Hybrid	11150	8284	5480	3212	1464

Graph H7: Cumulative percentage of Revision for Total Hip Replacement by cement status excluding infection

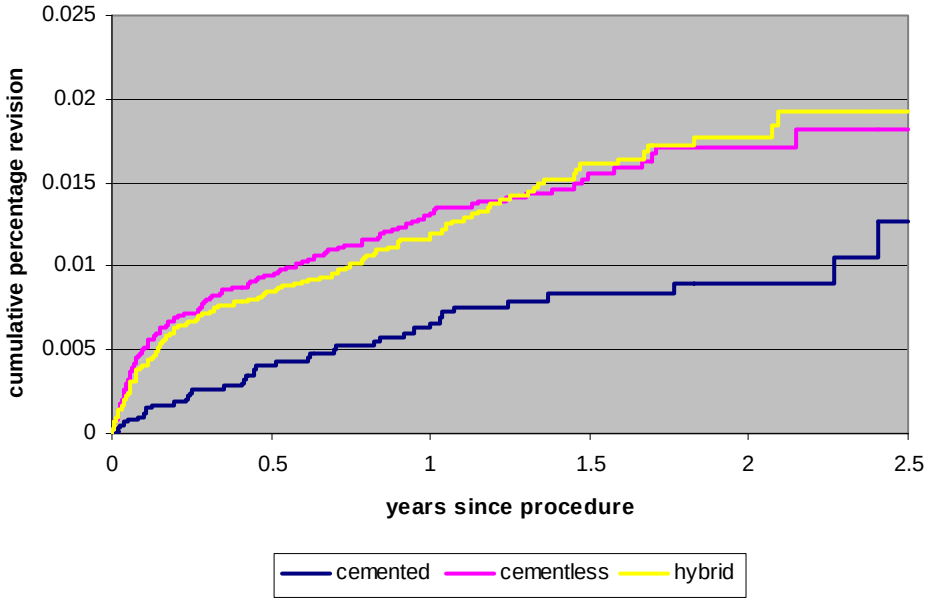


Table H50: Resurfacing Hip systems requiring revision

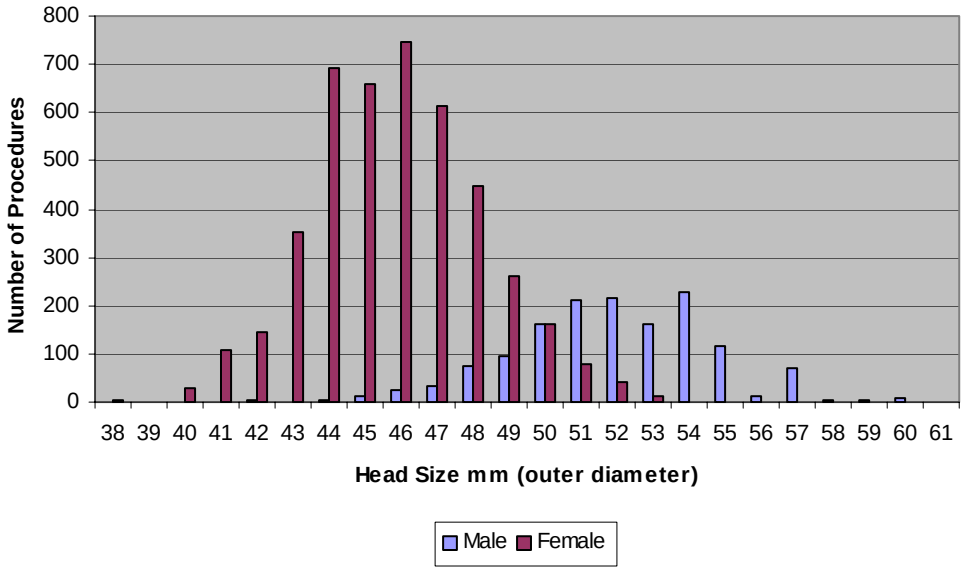
Resurfacing Head	*Resurfacing Cup*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
BHR	BHR	26	2043	1.3	1723	1.5	(0.99, 2.21)
Conserve		2	2	100.0	3	74.1	(8.97, 267.6)
Conserve Plus	Conserve Plus	0	8	0.0	10	0.0	(0.00, 35.54)
Cormet 2000	Cormet 2000	3	77	3.9	53	5.6	(1.16, 16.40)
Total	**-**	**31**	**2130**	**1.5**	**1789**	**1.7**	**(1.18, 2.46)**

Table H51: Components Used - Resurfacing - Hip systems requiring revision

Type of revision	*Primary Procedure*		*Revision Procedure*		*N*	*%*
	Resurfacing head	*Acetabular Component*	*Resurfacing head*	*Acetabular Component*		
Femoral Only	BHR	BHR	ABGII	N/R	1	3.2
			Alloclassic	N/R	1	3.2
			Alloclassic SL	N/R	1	3.2
			CLS	N/R	2	6.5
			Exeter	N/R	1	3.2
			MS 30	N/R	5	16.1
			Natural Hip	N/R	5	16.1
			Secur-Fit Plus	N/R	3	9.7
			Stability	N/R	1	3.2
	Cormet 2000	Cormet 2000	S-Rom	N/R	2	6.5
			Taper Fit	N/R	1	3.2
Acetabular Only	BHR	BHR	-	BHR	3	9.7
Femoral & Acetabular	BHR	BHR	CLS	Fitmore	1	3.2
			Proxima	DC_Fit	1	3.2
			S-Rom	Option	1	3.2
	Conserve		Exeter	Vitalock	2	6.5
Total					**31**	**100.0**

Note: *model name not repeated but continues down the column until change of model name*
N/R equals not revised

Graph H8: Distribution of Unipolar Head Diameter by Gender



Graph H9: Distribution of Bipolar Head Size by Gender

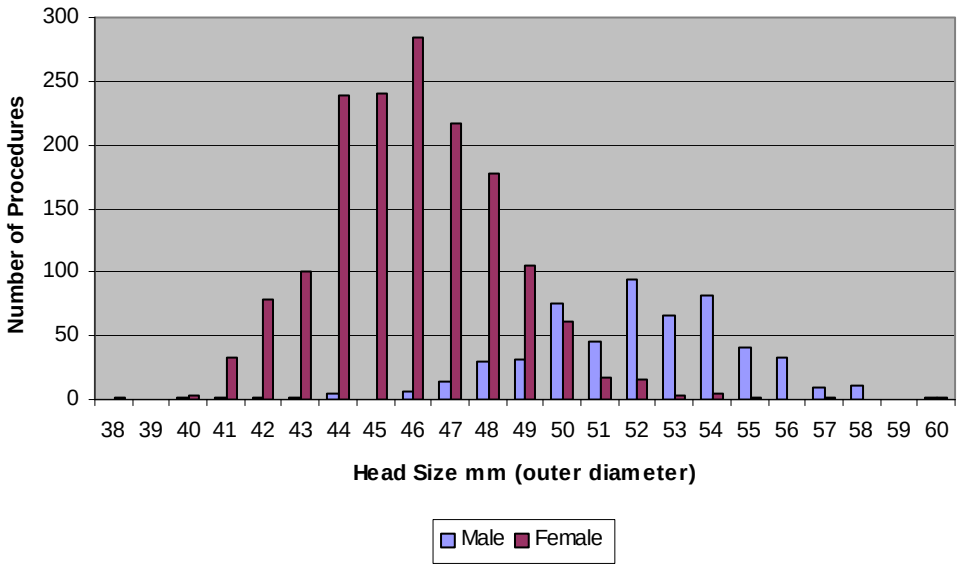


Table H52: Femoral Head Size for Primary Total Hips

	Primary						Total	
	Total Hip Systems		Resurfacing System		Thrust Plate			
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
22 MM	2102	6.9	-	-	-	-	2102	6.4
26 MM	5324	17.4	-	-	-	-	5324	16.2
28 MM	19426	63.4	-	-	66	93.0	19492	59.4
30 MM	21	0.1	-	-	-	-	21	0.1
32 MM	2943	9.6	-	-	-	-	2943	9.0
36 MM	586	1.9	-	-	-	-	586	1.8
38 MM	191	0.6	16	0.8	5	7.0	212	0.6
40 MM	3	0.0	4	0.2	-	-	7	0.0
42 MM	4	0.0	241	11.3	-	-	245	0.7
44 MM	2	0.0	12	0.6	-	-	14	0.0
45 MM	-	-	1	0.0	-	-	1	0.0
46 MM	9	0.0	464	21.8	-	-	473	1.4
48 MM	4	0.0	30	1.4	-	-	34	0.1
50 MM	11	0.0	715	33.6	-	-	726	2.2
52 MM	-	-	32	1.5	-	-	32	0.1
53 MM	-	-	1	0.0	-	-	1	0.0
54 MM	8	0.0	503	23.6	-	-	511	1.6
56 MM	-	-	4	0.2	-	-	4	0.0
58 MM	1	-	107	5.0	-	-	108	0.3
Total	**30635**	**100.0**	**2130**	**100.0**	**71**	**100.0**	**32836**	**100.0**

Note: *16 heads sizes were unable to be confirmed but are likely to be the same as the acetabular components used and as such have been classified accordingly*

Table H53: 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*	*%††*
22mm	1816	6.8	22	1.21	12	54.5	0.66	10	0.55
26mm	4728	17.6	63	1.33	39	61.9	0.82	24	0.51
28mm	16953	63.1	197	1.16	76	38.6	0.45	121	0.71
>= 30mm	3355	12.5	32	0.95	9	28.1	0.27	23	0.69
Total	**26852**	**100.0**	**314**	**1.17**	**136**	**43.3**	**0.51**	**178**	**0.66**

test for trend (revisions due to dislocation) P=0.0008
test for trend (revisions NOT due to dislocation) P=0.2115

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 1/09/1999-31/12/2002. In this Report we detail information on 47,500 knee procedures compared to 22,000 procedures in the 2002 Report

Demographics

The total number of knee replacement procedures has increased and the proportion of different types of knee procedures has remained largely similar. Total knee replacements account for 77%. There is a slight increase in unicompartmental knee replacements (14%), 9% are revision total knee replacements, and less than one per cent are patellar/trochlear (Table K1). Primary total knee replacements are performed more commonly in women than men (56.4%: 43.6%), and uni-compartmental knee replacements are performed more commonly in men (52.2%:47.8%) (Tables K4 and K5, Graphs K2 and K3). Patellar/trochlear re-placements are performed predominantly for osteoarthritis, and more commonly in women (72.7%: 23.7%) (Table K3 and Graph K1).

The age of patients undergoing revision total knee replacement is only slightly older than patients having primary total knee replacements. A greater number of females have revision total knee replacements (53.2%: 46.8%) (Table K6, Graph K4). As in last year's Report, this group includes all patients who have had reoperations following unicompartmental, patella/ trochlear, primary total knee replacements and previous revision procedures.

Osteoarthritis remains the most common diagnosis of all forms of primary knee replacement (Tables K7-K9). Loosening remains the most common reason for revision knee replacement (37.8%). The incidence of infection (12.7%) is virtually unchanged from last year's Report, and remains a major cause for revision. Tibial wear (10.8%) remains a major cause for revision. Implant breakage remains a concern. In this Report we have for the first time identified tibial and femoral breakage. (Table K10). It is still not possible however to identify the primary prostheses unless the Registry has recorded the primary procedures.

Prosthesis Usage and Fixation for Primary Knee Replacement

Four types of patellar/trochlear replacement have been used, and in four, only the trochlear was replaced (Table K11). Fourteen types of unicompartmental knee replacements have been used: the Oxford 3, the Repecci and Allegretto being the most common. As previously reported in 2002 over 90% were cemented (Tables K12 and K13).

Cement fixation is used in 77% of total knee replacements, however there is a wide variation between states, with a higher proportion of cementless fixation used in New South Wales and Tasmania. When patellar replacement is used, 93% are cemented (Table K14).

The LCS remains the most common primary total knee replacement, no matter which form of fixation is used (Table K15-K18). The Registry has recorded 56 other types of primary total knee replacements. The 10 most commonly used prostheses are similar to those reported last year. This group accounts for 85.5% of all procedures (Table K19).

Prosthesis Usage and Fixation for Revision Total Knee Replacement

Knee revision has been classified as major or minor revisions. A major revision involves the insertion of a major component that interfaces with bone i.e. a femoral or tibial component. A minor revision is the removal of a component (including the patella) that does not interface with bone, for example a tibial insert. Of the 4216 revisions, 65.3 % have been major

revisions, and 34.7% minor revisions (Tables K20and21). The tibial and femoral components have been revised in 71.3% and the tibial component only in 14.9% (Table K20). The majority of components (79.6%) are cemented in major revision knee replacement. Twenty-four uni-compartmental knee replacements have been revised to unicompartmental knees (Table K23).

Table K24 presents information on the prostheses used in total knee revision, 90% of these components were cemented. Table K25 records the major revision knee replacements where the tibial component only was replaced, 94% of which were cemented. Table K26 records the major revision knee replacement where the femoral component only was replaced, 95% of which were cemented. As in the 2002 Report, some indication of the type of knee prosthesis being revised could be deduced from the tibial inserts used. As there is no method of verifying this, the Registry does not record the original type of prosthesis for this group.

Table K27 records minor revisions where a patella only was used, and Table K28 where a tibial insert only was used. Tables K29 and K30 record minor revisions where both patellar and tibial inserts were used.

In this Report we are presenting classification of prostheses based on both degree and nature of the tibial insert as well as the intrinsic stability of the prosthesis. In particular the movement of the tibial insert has been defined as rotating or rotating-sliding or a combination of rotating and sliding. Those inserts that do not move have been defined as fixed. This group includes both moulded and fixed inserts. Stability has been defined as posterior stabilised, fully stabilised or hinged. All other primary total knee replacements that do not fit into these categories are defined as minimally stabilised. In general with revision knee replacements it can be observed that stability increases and movement of the tibial component decreases. The most common insert used in primary total knee is a minimally stabilised fixed insert accounting for 60% of all primary total knee replacements. Posterior stabilised knees are used 12.8% of the time. Just under 30% of all inserts have some degree of intrinsic movement.

Bilateral Primary Knee Replacement

Eighteen per cent of the 4317 patients recorded in the Registry had bilateral primary knee replacements, and of the bilateral procedures, 40% were carried out on the same day (Tables K1 and K32). The mortality figures for bilateral knee replacements are presented in the Mortality section of this Report.

Registry Recorded Primary to Revision Surgery

The Registry has information on 551 revisions of primary knee replacements already recorded within the Registry. This now represents 13% of all revisions recorded in the Registry, an increase from 7.5% in the 2002 Report. Of the 551 revisions, 88% were performed more than six weeks after the original procedure (Table K33). As in the 2002 Report, loosening (29.8%) and infection (19.2%) were the most common causes for revision (Table K34). This figure of 19.2% does not represent the infection rate for knee replacement surgery, but the percentage of revision procedures undertaken for infection.

The types of revision procedures undertaken are recorded in Table K35. The patella/trochlear components requiring revision are recorded in Table K38. The overall revision rate for this group is 1.9%.

The revision rate for unicompartmental primary knee replacement is 2.3%. This has increased from 1.49% reported last year. In the 2002 Report, 14 Allegretto knees were revised. An additional 19 were revised in 2002 (Table 39). The Allegretto failure rate remains significant. The Hazard Ratio has declined from 3.0 to 1.59; 95% CI (1.05, 2.40) p-value<0.027. The analysis is presented in the Kaplan-Meier survival graphs for cumulative percentage of unicompartmental primary knee procedures (Graphs K5 and K6).

These data continue to indicate a significantly increased early revision rate for the Allegretto Knee compared to other unicompartmental knees. The remaining observed figures presented in Table K39 are not statistically significant. This situation will continue to be closely monitored.

Details of total primary knee procedures requiring revisions are recorded in Table K40. None of the components in this table have been singled out for special attention on the basis of an increase in failure rate relative to other prostheses in this class.

Registry Recorded Revision to Revision Knee Replacements

The Registry has now recorded 311 revision knee replacements that have undergone subsequent revision. The majority of these revisions are for infection (50.2%), many of which are the second stage of a two-stage revision. Loosening (27.3%) is the next most common cause for revision. The other reasons for repeat revisions are recorded in Table K41.

Knee Replacement - 1/9/1999 to 31/12/2002

Table K1: Number of Knee Replacements by sex

Type of knee replacement	*Female*		*Male*		*Total*	
	Number	*%*	*Number*	*%**	*Number*	*%*
Patellar/trochlear	117	0.2	44	0.1	161	0.3
Unicompartmental Knee	3203	6.7	3497	7.4	6700	14.1
Primary Total Knee	20548	43.2	15894	33.4	36442	76.7
Revision Knee	2243	4.7	1973	4.2	4216	8.9
Total	**26111**	**54.9**	**21408**	**45.1**	**47519**	**100.0**

Note: *percents shown are out of 47519*

Definitions

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 31/12/2002

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

	Female *N=26111 (54.9%)*	***Male*** *N=21408 (45.1%)*	***All Patients*** *N=47519 (100.0%)*
Median	71	70	70
Minimum	13	15	13
Maximum	100	99	100
Mean	69.5	68.8	69.1
Standard Deviation	9.7	9.5	9.6

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

	Female *N=117 (72.7%)*	***Male*** *N=44 (27.3%)*	***All Patients*** *N=161 (100.0%)*
Median	57	53	55
Minimum	34	33	33
Maximum	87	87	87
Mean	58.4	55.8	57.6
Standard Deviation	11.4	13.4	12.0

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

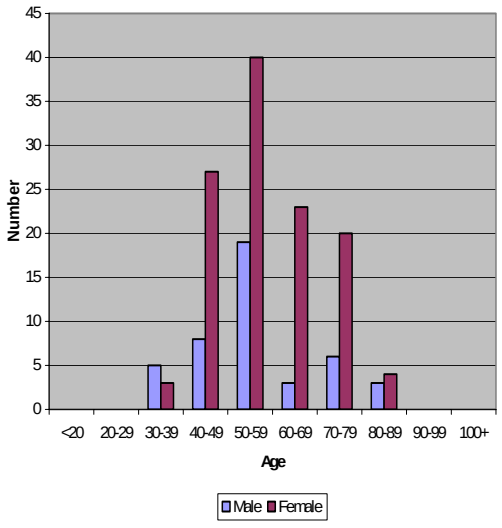


Table K4: Summary statistics of age (by sex) for Unicompartmental Knee Replacement

	Female *N=3203 (47.8%)*	*Male* *N=3497 (52.2%)*	*All Patients* *N=6700 (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	10.0

Graph K2: Age and Sex - Unicompartmental Knee Replacement

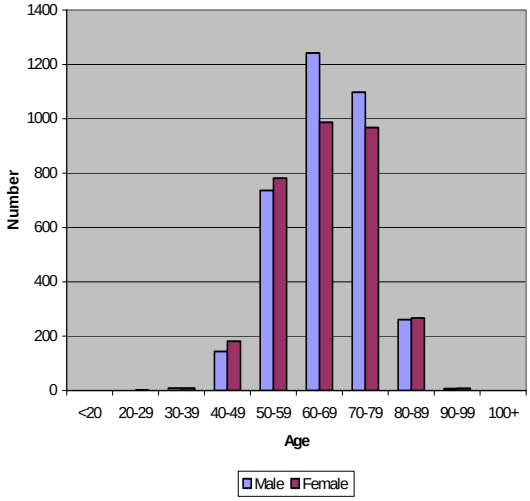


Table K5: Summary statistics of age (by sex) for Primary Total Knee Replacement

	Female *N=20548 (56.4%)*	*Male* *N=15894 (43.6%)*	*All Patients* *N=36442 (100.0%)*
Median	71	70	71
Minimum	13	15	13
Maximum	100	99	100
Mean	70.0	69.1	69.6
Standard Deviation	9.4	9.3	9.3

Graph K3: Age and Sex - Primary Total Knee Replacement

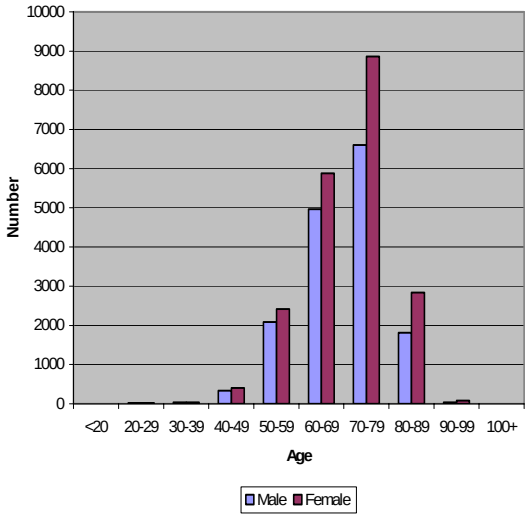
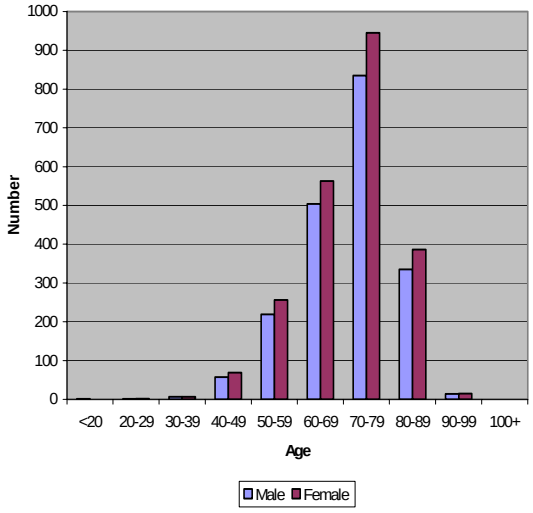


Table K6: Summary statistics of age (by sex) for Revision Knee Replacement

	Female *N=2243 (53.2%)*	***Male*** *N=1973 (46.8%)*	***All Patients*** *N=4216 (100.0%)*
Median	72	72	72
Minimum	22	18	18
Maximum	93	92	93
Mean	70.5	70.5	70.5
Standard Deviation	10.1	10.0	10.1

Graph K4: Age and Sex - Revision Total Knee Replacement



Diagnosis for Knee Replacement - 1/9/1999 to 31/12/2002

Table K7: Diagnosis - Patellar/trochlear Replacement

Diagnosis	*Number*	*%*
Osteoarthritis	158	98.1
Other Inflammatory Arthritis	3	1.9
Total	**161**	**100.0**

Table K8: Diagnosis - Unicompartmental Knee Replacement

Diagnosis	*Number*	*%**
Osteoarthritis	6590	98.4
Avascular Necrosis	69	1.0
Rheumatoid Arthritis	24	0.4
Other Inflammatory Arthritis	14	0.2
Tumour	1	0.0
Other	2	0.0
Total	**6700**	**100.0**

Table K9: Diagnosis - Primary Total Knee Replacement

Diagnosis	*Number*	*%*
Osteoarthritis	34966	95.9
Rheumatoid Arthritis	987	2.7
Other Inflammatory Arthritis	249	0.7
Avascular Necrosis	168	0.5
Tumour	42	0.1
Other	30	0.1
Total	**36442**	**100.0**

Table K10: Diagnosis - Revision Knee Replacement

Diagnosis	*Number*	*%*
Loosening	1839	37.8
Infection	617	12.7
Wear Tibial	525	10.8
Lysis	366	7.5
Patello Femoral Pain	299	6.2
Pain	242	5.0
Implant Breakage Tibial	148	3.0
Instability	134	2.8
Fracture	109	2.2
Wear Patella	95	2.0
Implant Breakage Patella	85	1.7
Progression of Disease	83	1.7
Arthrofibrosis	66	1.4
Malalignment	41	0.8
Implant Breakage Femoral	35	0.7
Bearing/Dislocation	32	0.7
Dislocation	29	0.6
Patella Maltracking	26	0.5
Synovitis	25	0.5
Incorrect Sizing	25	0.5
Avascular Necrosis	8	0.2
Heterotropic Bone	5	0.1
Other	25	0.5
Total	**4859**	**100.0**

Note: *some patients had multiple diagnoses*

Prosthesis Fixation and Usage for Patellar/trochlear Knee Replacement

1/9/1999 to 31/12/2002

Table K11: Prosthesis Usage - Patellar/trochlear Replacement

Patellar/trochlear replacement	*Patella*	*Number*	*%*
Avon	-	3	1.9
	Kinemax Plus	80	49.7
LCS	LCS	12	7.5
Lubinus Patella Glide	Duracon	8	5.0
	Lubinus Patella Glide	18	11.2
MOD III	-	1	0.6
	LCS	3	1.9
	MOD III	36	22.4
Total		**161**	**100.0**

Note: *- patients had a previous patellectomy*

Prosthesis Fixation and Usage for Unicompartmental Knee Replacement

1/9/1999 to 31/12/2002

Table K12: Prosthesis Fixation - Unicompartmental Knee Replacement

Fixation	*Number*	*%*
Tibial and femoral cementless	538	8.0
Tibial and femoral cemented	6129	91.5
Tibial only cemented	4	0.1
Femoral only cemented	29	0.4
Total	**6700**	**100.0**

Table K13: Prosthesis Usage - Unicompartmental Knee Replacement

Prosthesis used	*Number*	*%*
Oxford 3	2954	44.1
Repecci	911	13.6
Allegretto Uni Knee	710	10.6
M/G	616	9.2
Preservation	522	7.8
Unix	446	6.7
Genesis	202	3.0
PFC Sigma	137	2.0
Natural Knee	83	1.2
GRU	45	0.7
Other (4)	74	1.1
Total	**6700**	**100.0**

Prosthesis Fixation and Usage for Primary Total Knee Replacement

1/9/1999 to 31/12/2002

Table K14: Prosthesis Fixation - Primary Total Knee Replacement

Fixation	*Total*		*Patella used*			
			Patella cementless		*Patella cemented*	
	Number	*%*	*Number*	*%†*	*Number*	*%†*
Tibial and femoral cementless	8140	22.3	808	9.9	1455	17.9
Tibial and femoral cemented	17787	48.8	31	0.2	8548	48.1
Tibial only cemented	10251	28.1	151	1.5	4005	39.1
Femoral only cemented	264	0.7	5	1.9	136	51.5
Total	**36442**	**100.0**	**995**	**2.7**	**14144**	**38.8**

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	2498	30.7	807	32.3
Nexgen	1271	15.6	240	18.9
Duracon	878	10.8	130	14.8
Natural Knee	598	7.3	280	46.8
Scorpio	588	7.2	156	26.5
Genesis II	308	3.8	37	12.0
Profix	293	3.6	42	14.3
Maxim	283	3.5	141	49.8
PFC Sigma	264	3.2	44	16.7
RBK	263	3.2	157	59.7
Other (18)	896	11.0	229	25.6
Total	**8140**	**100.0**	**2263**	**27.8**

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*	*%†*
LCS	2727	15.3	863	31.6
Genesis II	2664	15.0	1445	54.2
Duracon	2260	12.7	1216	53.8
Nexgen LPS	1430	8.0	774	54.1
PFC Sigma	1380	7.8	764	55.4
Nexgen	1359	7.6	466	34.3
Scorpio	1045	5.9	593	56.7
AGC	926	5.2	400	43.2
Kinemax Plus	829	4.7	730	88.1
Profix	771	4.3	273	35.4
Other (41)	2396	13.5	1055	44.0
Total	**17787**	**100.0**	**8579**	**48.2**

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	2399	23.4	942	39.3
Scorpio	1456	14.2	868	59.6
LCS	1208	11.8	359	29.7
PFC Sigma	1170	11.4	421	36.0
Nexgen	975	9.5	461	47.3
Genesis II	815	8.0	285	35.0
AGC	488	4.8	126	25.8
Natural Knee	437	4.3	239	54.7
Profix	277	2.7	61	22.0
AMK	147	1.4	14	9.5
Other (26)	879	8.6	380	43.2
Total	**10251**	**100.0**	**4156**	**40.5**

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*	*%†*
Profix	49	18.6	8	16.3
PFC Sigma	48	18.2	44	91.7
Scorpio	41	15.5	20	48.8
Duracon	24	9.1	10	41.7
Maxim	24	9.1	21	87.5
LCS	18	6.8	2	11.1
Nexgen	17	6.4	13	76.5
Genesis II	16	6.1	8	50.0
HMRS	4	1.5	1	25.0
Natural Knee	4	1.5	4	100.0
Other (10)	19	7.2	10	52.6
Total	**264**	**100.0**	**141**	**53.4**

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 31/12/2002

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

Femoral Prosthesis	*Number*	*%*
LCS	6451	17.7
Duracon	5561	15.3
Genesis II	3803	10.4
Nexgen	3622	9.9
Scorpio	3130	8.6
PFC Sigma	2862	7.9
Nexgen LPS	1554	4.3
AGC	1415	3.9
Profix	1390	3.8
Natural Knee	1362	3.7
Other (46)	5292	14.5
Total	**36442**	**100.0**

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

Prosthesis Fixation and Usage for Revision Knee Replacement

1/9/1999 to 31/12/2002

Table K20: Components Used - Major Revision Knee Replacement

Components Used	*Total*		*Patella used*			
			cementless		*cemented*	
	Number	*%*	*Number*	*%†*	*Number*	*%†*
Tibial and Femoral	1962	71.3	34	1.7	872	44.4
Tibial Only	410	14.9	12	2.9	91	22.2
Femoral Only	162	5.9	1	0.6	42	25.9
Uni Tibial and Femoral	13	0.5	-	-	-	-
Uni Tibial Only	24	0.9	-	-	-	-
Uni Femoral Only	15	0.5	-	-	-	-
Cement spacer	118	4.3	-	-	-	-
Removal of Prostheses	29	1.1	-	-	-	-
Fusion Nail	12	0.4	-	-	-	-
Reinsertion of Components	2	0.1	-	-	-	-
Patella/Trochlear Resurfacing	3	0.1	-	-	2	66.7
Total	**2750**	**100.0**	**47**	**1.7**	**1007**	**36.6**

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	585	39.9
Patella Only	416	28.4
Insert and Patella	406	27.7
Uni Insert Only	44	3.0
Removal of patella	8	0.5
Cable/ Other minor components	7	0.5
Total	**1466**	**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	1588	57.7	128	4.7	176	6.4	70	2.5	-	-	1962	71.3
Tibial Only	398	14.5	12	0.4	-	-	-	-	-	-	410	14.9
Femoral Only	150	5.5	12	0.4	-	-	-	-	-	-	162	5.9
Uni Tibial and Femoral	12	0.4	1	0.0	-	-	-	-	-	-	13	0.5
Uni Tibial Only	22	0.8	2	0.1	-	-	-	-	-	-	24	0.9
Uni Femoral Only	15	0.5	-	-	-	-	-	-	-	-	15	0.5
Cement spacer	-	-	-	-	-	-	-	-	118	4.3	118	4.3
Removal of Prostheses	-	-	-	-	-	-	-	-	29	1.1	29	1.1
Fusion Nail	-	-	-	-	-	-	-	-	12	0.4	12	0.4
Reinsertion of Components[†]	1	0.0	-	-	-	-	1	0.0	-	-	2	0.1
Patella/Trochlear Resurfacing	3	0.1	-	-	-	-	-	-	-	-	3	0.1
Total	**2189**	**79.6**	**155**	**5.6**	**176**	**6.4**	**71**	**2.6**	**159**	**5.8**	**2750**	**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	8	9	6	23	44.2
Preservation	4	2	1	7	13.5
Genesis	1	-	3	4	7.7
Repecci	2	-	2	4	7.7
PFC Sigma	3	1	-	4	7.7
Endo-Model Sled	3	-	-	3	5.8
Allegretto Uni Knee	-	2	-	2	3.8
M/G	1	1	-	2	3.8
Unix	1	-	1	2	3.8
Natural Knee	1	-	-	1	1.9
Total	**24**	**15**	**13**	**52**	**100.0**

Table K24: Prosthesis Usage – Total Revision Knee Replacement

Prosthesis Used	*Total*		*Patella used*	
	Number	*%*	*Number*	*%[†]*
Genesis II cemented	266	13.6	130	48.9
PFC Sigma *cemented*	184	9.4	90	48.9
Duracon *cemented*	165	8.4	94	57.0
Nexgen LCCK *cemented*	123	6.3	45	36.6
LCS *cemented*	119	6.1	52	43.7
S-Rom *cemented*	118	6.0	43	36.4
Profix *cemented*	117	6.0	54	46.2
Scorpio *cemented*	86	4.4	50	58.1
Natural Knee *cemented*	74	3.8	48	64.9
Nexgen LPS *cemented*	60	3.1	36	60.0
Other (58)	650	33.1	264	40.6
Total	**1962**	**100.0**	**906**	**46.2**

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*	59	14.4	12	20.3
Duracon	*cemented*	52	12.7	15	28.8
Genesis II	*cemented*	48	11.7	9	18.8
PFC Sigma	*cemented*	34	8.3	14	41.2
Natural Knee	*cemented*	30	7.3	6	20.0
M/G II	*cemented*	26	6.3	11	42.3
I/B II	*cemented*	20	4.9	3	15.0
Kinemax Plus	*cemented*	18	4.4	3	16.7
Nexgen	*cemented*	17	4.1	3	17.6
Series 7000	*cemented*	15	3.7	4	26.7
Other (29)		91	22.2	23	25.3
Total		**410**	**100.0**	**103**	**25.1**

Note: *- equals no patella used*
†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*	*%†*
LCS	*cemented*	23	14.2	6	26.1
PFC Sigma	*cemented*	16	9.9	6	37.5
Duracon-	*cemented*	14	8.6	3	21.4
Profix	*cemented*	13	8.0	2	15.4
Coordinate	*cemented*	7	4.3	2	28.6
Genesis II	*cemented*	7	4.3	3	42.9
Kinemax Plus	*cemented*	6	3.7	3	50.0
Nexgen LCCK	*cemented*	6	3.7	3	50.0
Genesis	*cemented*	5	3.1	1	20.0
MRS	*cemented*	5	3.1	1	20.0
Other (29)		60	37.0	13	21.7
Total		**162**	**100.0**	**43**	**26.5**

Note: *- equals no patella used*
†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	72	17.3
Genesis II	54	13.0
Duracon	47	11.3
Nexgen MBK	33	7.9
AGC	26	6.3
PFC Sigma	25	6.0
AMK	22	5.3
I/B II	18	4.3
Scorpio	15	3.6
Genesis	14	3.4
Other (19)	90	21.6
Total	**416**	**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	87	14.9
Duracon	77	13.2
M/G II	52	8.9
Genesis	42	7.2
M/G	37	6.3
PFC Sigma	36	6.2
Advantim	34	5.8
PCA	31	5.3
Nexgen	30	5.1
Genesis II	25	4.3
Other (27)	134	22.9
Total	**585**	**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	*%*
I/B II	67	16.5
M/G II	67	16.5
Duracon	35	8.6
Advantim	32	7.9
PFC Sigma	29	7.1
LCS	27	6.7
Nexgen MBK	22	5.4
Genesis	20	4.9
Genesis II	20	4.9
PCA	16	3.9
Other (15)	71	17.5
Total	**406**	**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	69	17.0
M/G	64	15.8
Duracon	33	8.1
Genesis	29	7.1
PFC Sigma	28	6.9
LCS	27	6.7
Advantim	20	4.9
PCA	19	4.7
Nexgen	17	4.2
Ortholoc II	14	3.4
Other (22)	86	21.2
Total	**406**	**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	29	65.9
M/G	10	22.7
Unix	2	4.5
Genesis	2	4.5
Oxford 2	1	2.3
Total	**44**	**100.0**

Table K32: Movement - Primary Total knees

Movement	*Stabilisation*	*N*	*%*
Fixed	Minimal	22003	60.4
	Posterior Stabilised	3792	10.4
	Fully Stabilised	129	0.4
	Hinged	25	0.1
Rotating	Minimal	7169	19.7
	Posterior Stabilised	867	2.4
	Fully Stabilised	1	0.0
	Hinged	38	0.1
Rotating - Sliding	Minimal	1358	3.7
Sliding	Minimal	1060	2.9
Total		**36442**	**100.0**

Note: *Includes inserts, moulded inserts, and Total Knee (i.e. LINK Endo-Model Rotational), 21 inserts were unable to be confirmed but were classified according to the femoral and tibial components used.*

Table K33: Movement - Revision knees

Movement	*Stabilisation*	*N*	*%*
Fixed	Minimal	1698	49.0
	Posterior Stabilised	635	18.3
	Fully Stabilised	373	10.8
	Hinged	29	0.8
Rotating	Minimal	370	10.7
	Posterior Stabilised	133	3.8
	Fully Stabilised	1	0.0
	Hinged	136	3.9
Sliding	Minimal	55	1.6
Rotating-Sliding	Minimal	32	0.9
Total		**3462**	**100.0**

Note: *Includes inserts, moulded inserts, and Total Knee (i.e. LINK Endo-Model Rotational), 3 inserts were unable to be confirmed but were classified according to the femoral and tibial components used.*

Bilateral Knee Replacement - 1/9/1999 to 31/12/2002

Table K34: 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	12	0.3	-	-	-	-	2	0.0	5	0.1	19	0.4
Both Primary Total Knee	1318	30.5	67	1.6	29	0.7	776	18.0	1282	29.7	3472	80.4
Both Unicompartmental	382	8.8	18	0.4	2	0.0	121	2.8	133	3.1	656	15.2
Patella/trochlear & Primary Total Knee	-	-	-	-	-	-	-	-	1	0.0	1	0.0
Unicompartmental Knee & Primary Total Knee	54	1.3	2	0.0	3	0.1	30	0.7	80	1.9	169	3.9
Total	**1766**	**40.9**	**87**	**2.0**	**34**	**0.8**	**929**	**21.5**	**1501**	**34.8**	**4317**	**100.0**

Registry Recorded Primary to Revision Knee Replacement

1/9/1999 to 31/12/2002

Table K35: Days to Revision by Primary procedure type

Primary Procedure (N)	***Days to revision Procedure***										***Total***		***% revised***
	Same Day		*<2 weeks*		*2-6 weeks*		*6 weeks - 1 year*		*>1 year*				
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*%*
Patellar/trochlear (161)	-	-	1	0.2	-	-	1	0.2	1	0.2	3	0.5	1.9
Uni (6700)	-	-	1	0.2	8	1.5	95	17.2	50	9.1	154	27.9	2.3
Primary Total (36442)	1	0.2	18	3.3	35	6.4	217	39.4	123	22.3	394	71.5	1.1
Total (4303)	**1**	**0.2**	**20**	**3.6**	**43**	**7.8**	**313**	**56.8**	**174**	**31.6**	**551**	**100.0**	**1.3**

Table K36: 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*	*%*
Arthrofibrosis	-	-	-	-	-	-	11	1.9	5	0.9	16	2.8
Avascular Necrosis	-	-	-	-	-	-	5	0.9	2	0.3	7	1.2
Bearing/Dislocation	-	-	2	0.3	2	0.3	10	1.7	2	0.3	16	2.8
Other	-	-	1	0.2	1	0.2	8	1.4	1	0.2	11	1.9
Dislocation	-	-	4	0.7	-	-	5	0.9	2	0.3	11	1.9
Fracture	1	0.2	1	0.2	4	0.7	13	2.2	2	0.3	21	3.6
Implant Breakage Femoral	-	-	-	-	-	-	2	0.3	-	-	2	0.3
Implant Breakage Patella	-	-	-	-	-	-	1	0.2	-	-	1	0.2
Implant Breakage Tibial	-	-	-	-	-	-	3	0.5	1	0.2	4	0.7
Incorrect Sizing	-	-	2	0.3	-	-	6	1.0	2	0.3	10	1.7
Infection	-	-	3	0.5	25	4.3	63	10.9	20	3.5	111	19.2
Instability	-	-	-	-	5	0.9	17	2.9	7	1.2	29	5.0
Loosening	-	-	7	1.2	5	0.9	103	17.8	57	9.9	172	29.8
Lysis	-	-	-	-	-	-	4	0.7	4	0.7	8	1.4
Malalignment	-	-	2	0.3	1	0.2	7	1.2	5	0.9	15	2.6
Pain	-	-	-	-	1	0.2	25	4.3	19	3.3	45	7.8
Patella Maltracking	-	-	-	-	-	-	3	0.5	-	-	3	0.5
Patello Femoral Pain	-	-	-	-	1	0.2	31	5.4	33	5.7	65	11.2
Progression of Disease	-	-	-	-	-	-	6	1.0	10	1.7	16	2.8
Synovitis	-	-	-	-	-	-	2	0.3	-	-	2	0.3
Wear Patella	-	-	-	-	-	-	-	-	3	0.5	3	0.5
Wear Tibial	-	-	-	-	-	-	5	0.9	5	0.9	10	1.7
Total	**1**	**0.2**	**22**	**3.8**	**45**	**7.8**	**330**	**57.1**	**180**	**31.1**	**578**	**100**

Note: *some patients had multiple diagnoses*

Table K37: Primary to Revision procedure types

Primary	*Revision*	*Number*	*%*
Patella/trochlear	Tibial and Femoral	2	0.4
	Patella/Trochlear Resurf	1	0.2
Unicompartmental Knee	Tibial and Femoral	111	20.1
	Uni Tibial and Femoral	3	0.5
	Uni Tibial Only	10	1.8
	Uni Femoral Only	10	1.8
	Uni Insert Only	18	3.3
	Cement spacer	2	0.4
Primary Total Knee	Tibial and Femoral	74	13.4
	Tibial Only	51	9.3
	Femoral Only	31	5.6
	Insert and Patella	37	6.7
	Patella Only	78	14.2
	Insert Only	96	17.4
	Cement spacer	17	3.1
	Removal of Prostheses	7	1.3
	Fusion Nail	1	0.2
	Cable/Other minor comps	2	0.4
Total		**551**	**100.0**

Table K38: Components Used – Patellar/trochlear procedures requiring revision

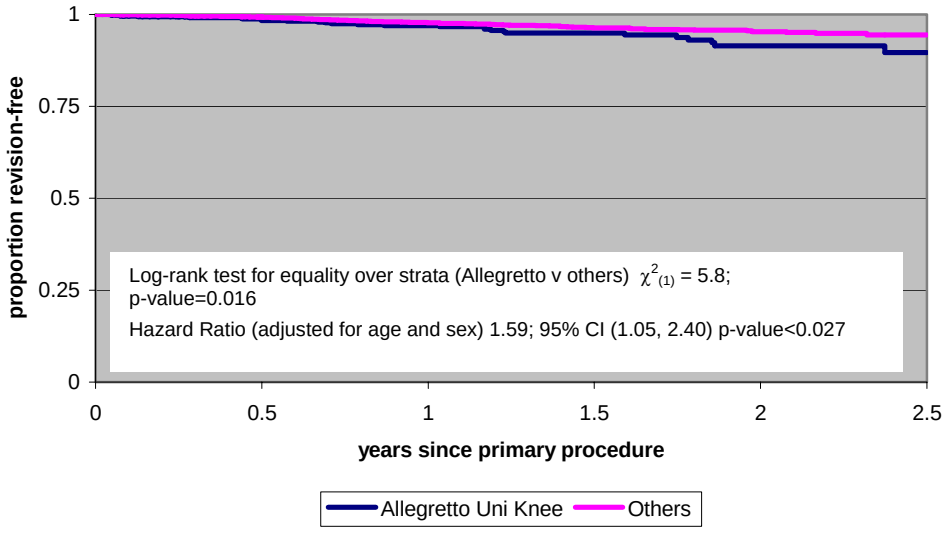
Patellar/ Trochlear	*Patella*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
Avon		0	3	0.0	5	0.0	(0.00, 81.66)
Avon	Kinemax Plus	0	80	0.0	98	0.0	(0.00, 3.77)
LCS	LCS	0	12	0.0	2	0.0	(0.00, 197.0)
Lubinus Patella Glide	Duracon	0	8	0.0	2	0.0	(0.00, 193.6)
Lubinus Patella Glide	Lubinus Patella Glide	2	18	11.1	15	12.9	(1.56, 46.65)
MOD III		0	1	0.0	1	0.0	(0.00, 620.9)
MOD III	LCS	0	3	0.0	2	0.0	(0.00, 188.7)
MOD III	MOD III	1	36	2.8	62	1.6	(0.04, 9.03)
Total		**3**	**161**	**1.9**	**186**	**1.6**	**(0.33, 4.72)**

Table K39: 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	28	710	3.9	758	3.7	(2.46, 5.34)
M/G	10	616	1.6	631	1.6	(0.76, 2.91)
Oxford 3	80	2954	2.7	3022	2.6	(2.10, 3.30)
PFC Sigma	7	137	5.1	218	3.2	(1.29, 6.61)
Preservation	11	522	2.1	290	3.8	(1.90, 6.80)
Repecci	6	911	0.7	761	0.8	(0.29, 1.72)
Unix	3	446	0.7	437	0.7	(0.14, 2.01)
Others	9	404	2.2	343	2.6	(1.20, 4.98)
Total	**154**	**6700**	**2.3**	**6459**	**2.4**	**(2.02, 2.79)**

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

Graph K5: Kaplan-Meier Survival of Unicompartmental Knees



	Number at risk at start of the period					
	0	*0.5*	*1*	*1.5*	*2*	*2.5*
Others	5990	4142	2550	1251	510	118
Allegretto Uni Knee	710	524	330	185	96	33

Graph K6: Cumulative percentage of Revision of Unicompartmental Knee Primary Procedures

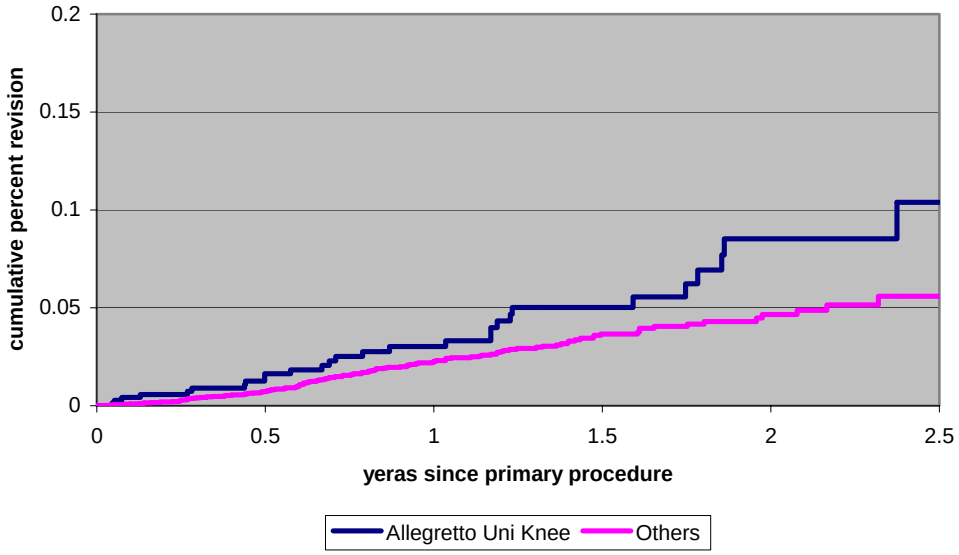


Table K40: Total Primary Knee Procedures requiring Revision

Femoral Component	*Tibial Component*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
AGC	AGC	9	1411	0.6	1755	0.5	(0.23, 0.97)
Advantim	Advantim	2	359	0.6	596	0.3	(0.04, 1.21)
Duracon	Duracon	66	5560	1.2	5802	1.1	(0.88, 1.45)
Genesis II	Genesis II	38	3249	1.2	3497	1.1	(0.77, 1.49)
Genesis II	Mobile Bearing	11	554	2.0	665	1.7	(0.83, 2.96)
Kinemax Plus	Kinemax Plus	13	854	1.5	945	1.4	(0.73, 2.35)
LCS	LCS	66	4949	1.3	6296	1.0	(0.81, 1.33)
LCS	MBT	5	1455	0.3	801	0.6	(0.20, 1.46)
Maxim	Maxim	7	569	1.2	534	1.3	(0.53, 2.70)
Natural Knee	Natural Knee	19	1360	1.4	1295	1.5	(0.88, 2.29)
Nexgen	Nexgen	18	3619	0.5	3719	0.5	(0.29, 0.76)
Nexgen LPS	Nexgen	18	1554	1.2	1544	1.2	(0.69, 1.84)
PFC Sigma	PFC Sigma	25	2525	1.0	2452	1.0	(0.66, 1.50)
Profix	Profix	15	1061	1.4	967	1.6	(0.87, 2.56)
Scorpio	Scorpio	7	1107	0.6	929	0.8	(0.30, 1.55)
Scorpio	Series 7000	21	2023	1.0	2255	0.9	(0.58, 1.42)
Others (64 combs)	-	54	4233	1.3	4238	1.3	(0.96, 1.66)
Total		**394**	**36442**	**1.1**	**38290**	**1.0**	**(0.93, 1.14)**

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

Table K41: Days between procedures for Revision to Revision Knees, by Second Revision Diagnosis

2nd Revision Diagnosis	***Days to revision Procedure***								***Total***	
	<2 weeks		*2-6 weeks*		*6 weeks - 1 year*		*>1 year*			
	N	*%*	*N*	*%*	*N*		*%*		*N*	*%*
Arthrofibrosis	-	-	-	-	-	0.3	-	-	1	0.3
Avascular Necrosis	-	-	-	-	-	-	1	0.3	1	0.3
Bearing/Dislocation	-	-	-	-	2	0.6	-	-	2	0.6
Dislocation	1	0.3	1	0.3	4	1.3	-	-	6	1.9
Fracture	-	-	1	0.3	3	1.0	-	-	4	1.3
Implant Breakage Patella	-	-	1	0.3	-	-	-	-	1	0.3
Implant Breakage Tibial	-	-	1	0.3	2	0.6	2	0.6	5	1.6
Infection	9	2.9	17	5.5	117	37.6	13	4.2	156	50.2
Instability	-	-	-	-	4	1.3	3	1.0	7	2.3
Loosening	5	1.6	7	2.3	43	13.8	30	9.6	85	27.3
Lysis	1	0.3	3	1.0	7	2.3	1	0.3	12	3.9
Malalignment	-	-	-	-	1	0.3	-	-	1	0.3
Pain	-	-	-	-	4	1.3	2	0.6	6	1.9
Patella Maltracking	-	-	-	-	2	0.6	-	-	2	0.6
Patello Femoral Pain	-	-	-	-	4	1.3	2	0.6	6	1.9
Progression of Disease	-	-	-	-	-	-	1	0.3	1	0.3
Wear Patella	-	-	-	-	4	1.3	-	-	4	1.3
Wear Tibial	1	0.3	-	-	4	1.3	4	1.3	9	2.9
Other	1	0.3	1	0.3	-	-	-	-	2	0.6
Total	**18**	**5.8**	**32**	**10.3**	**202**	**65.0**	**59**	**19.0**	**311**	**100**

Note: *- equals component not exchanged*

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 31/12/2002.

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 73.8% of all cemented femoral stem fixation and 72.3% of cemented acetabular component fixation. The use of antibiotic containing cement has increased from that reported last year. It is now used in almost 50% of cases when either the stem or acetabular component is inserted with cement.

Antibiotic cement is used more frequently in revision hip surgery. It is utilised in over 70% of cement fixation for both femoral and acetabular components (Table C2).

Cement Use in Knee Replacement

The most common cement used for each of the components in primary knee replacement is Palacos R. Cement containing antibiotic is used in almost half of all cemented components (Table C3).

In revision knee replacement 70% to 80% of the cemented components are inserted using antibiotic cement. There is a slight variation depending on which of the components are cemented (femur, tibia or patella) (Table C4).

Number of Different Types of Cement Used

As mentioned there is a small number of different types of cement used for the majority of procedures. There are however 26 different cements that have been reported. Many of these have only been used in a small number of cases. This can be observed by examining the 'others' listing in each of the cement tables.

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

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Simplex P	7532	36.1	CMW 1 Plain	1506	24.6
Antibiotic Simplex	3668	17.6	Simplex P	1159	19.0
Palacos R	2231	10.7	Palacos R	1130	18.5
CMW 1 Plain	1961	9.4	Antibiotic Simplex	621	10.2
Simplex Tobra	1493	7.2	Simplex Tobra	592	9.7
Palacos E	980	4.7	CMW 2 Plain	365	6.0
CMW 1G	837	4.0	CMW 1G	328	5.4
CMW 3G	436	2.1	CMW 2G	252	4.1
CMW 3 Plain	426	2.0	Palacos E	47	0.8
CMW Endurance	276	1.3	CMW 3G	45	0.7
Other types (20)	1039	5.0	Other types (15)	69	1.1
Total	**20879**	**100.0**	**Total**	**6114**	**100.0**

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

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

Femur	*Number*	*%*	*Acetabulum*	*Number*	*%*
Antibiotic Simplex	395	25.5	Palacos R	444	30.9
Simplex Tobra	261	16.8	CMW 1G	258	18.0
Simplex P	253	16.3	Antibiotic Simplex	208	14.5
Palacos R	252	16.3	CMW 1 Plain	155	10.8
CMW 1G	105	6.8	Simplex Tobra	152	10.6
CMW 1 Plain	82	5.3	Simplex P	91	6.3
Palacos E	54	3.5	CMW 2G	43	3.0
CMW 3G	41	2.6	CMW 2 Plain	40	2.8
CMW 3 Plain	24	1.5	CMW 3G	13	0.9
Vacumix CMW 3G	15	1.0	Palacos E	13	0.9
Other types (13)	67	4.3	Other types (9)	20	1.4
Total	**1549**	**100.0**	**Total**	**1437**	**100.0**

Note: *more than one type of cement was used in some procedures*

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

Femur	*N*	*%*	*Tibia*	*N*	*%*	*Patella*	*N*	*%*
Palacos R	6620	27.1	Palacos R	7892	23.1	Palacos R	3663	25.6
CMW 1 Plain	4074	16.7	CMW 1 Plain	5559	16.3	Antibiotic Simplex	2052	14.4
Simplex P	3785	15.5	Simplex P	5419	15.8	CMW 1 Plain	2050	14.3
Antibiotic Simplex	2669	10.9	CMW 2 Plain	4754	13.9	Simplex P	2005	14.0
CMW 1G	2458	10.1	Antibiotic Simplex	3486	10.2	CMW 2 Plain	1817	12.7
CMW 2 Plain	2358	9.7	CMW 1G	3128	9.1	CMW 1G	985	6.9
CMW 2G	666	2.7	Simplex Tobra	1233	3.6	Simplex Tobra	739	5.2
Simplex Tobra	608	2.5	CMW 2G	1088	3.2	CMW 2G	234	1.6
Palamed	491	2.0	Palamed	542	1.6	Palamed	216	1.5
Palacos E	209	0.9	Palacos E	307	0.9	Sulcem 3	118	0.8
Other types (17)	452	1.9	Other types (15)	785	2.3	Other types (14)	416	2.9
Total	**24390**	**100.0**	**Total**	**34193**	**100.0**	**Total**	**14295**	**100.0**

Note: *more than one type of cement was used in some procedures*

Table C4: Revision Knee Replacement - Top Ten Cements used by Location

Femur	*N*	*%*	*Tibia*	*N*	*%*	*Patella*	*N*	*%*
Palacos R	767	38.2	Palacos R	850	35.3	Palacos R	512	28.4
CMW 1G	348	17.3	CMW 1G	427	17.7	CMW 2 Plain	342	19.0
Antibiotic Simplex	265	13.2	Antibiotic Simplex	287	11.9	CMW 1G	244	13.5
CMW 1 Plain	136	6.8	CMW 1 Plain	175	7.3	Antibiotic Simplex	181	10.0
Simplex Tobra	135	6.7	CMW 2 Plain	169	7.0	CMW 1 Plain	160	8.9
Simplex P	111	5.5	Simplex Tobra	160	6.6	Simplex P	142	7.9
CMW 2 Plain	98	4.9	Simplex P	140	5.8	Simplex Tobra	84	4.7
CMW 2G	51	2.5	CMW 2G	75	3.1	CMW 2G	57	3.2
Palamed	30	1.5	Palamed	31	1.3	Palamed	19	1.1
CMW 3G	17	0.8	Palacos E	25	1.0	CMW 3G	14	0.8
Other types (10)	49	2.4	Other types (12)	71	2.9	Other types (11)	48	2.7
Total	**2007**	**100.0**	**Total**	**2410**	**100.0**	**Total**	**1803**	**100.0**

Note: *more than one type of cement was used in some procedures*

Mortality Following Joint Replacement Surgery

Introduction

Mortality information has been obtained by matching Registry data with the National Death Index (NDI). The NDI is a database maintained by the Australian Institute of Health and Welfare. The NDI contains records of all deaths occurring in Australia since 1980. These have been provided by the Registrars of Births, Deaths and Marriages in each State and Territory.

The NDI has strict controls over access to its data (AIHW Act, 1987 and the Privacy Act, 1988) and applications for access must gain approval from the host institution and/or from the Australian Institute of Health and Welfare (AIHW) Ethics Committee. The AOA NJRR has obtained this approval.

For this Report the AIHW has undertaken a match of NDI and Registry data for the period September 1999 to December 2001. Therefore the mortality data is not based on all the Registry data prepared for this year's Report but only on the data from the 2002 Report. The reason for this is that there is a time lag before the NDI has complete mortality data.

This match was performed using a probabilistic record linkage package (Integrity) and was undertaken using multiple passes, which grouped the data, based on different characteristics (name, date of birth and gender) each time. The NDI then provides data to the Registry of 'matches'. After a careful analysis of the results the Registry makes a final decision to either accept or reject the 'matches". This is done on the basis of differences in name, date of birth, address of individuals and date of death.

Analysis and Presentation of Mortality data

Considerable work has gone into the analysis and presentation of this data. The Registry has decided to present a number of different analyses. In addition to crude cumulative mortality that was presented in the 2002 Report we have also included adjusted mortality as well as rate per 100 person years.

The adjusted mortality was obtained after direct standardisation of the crude cumulative mortality data by 5-year age intervals and by sex to the total Australian population from 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, 2001). This provides a true rate. Exact confidence intervals based on the Poisson distribution of the number of observed deaths are also given.

Error in 2002 Report Mortality Data

In the 2002 Annual Report, Tables M2 and M3 show mortality for hip and knee procedures respectively. The Registry has subsequently identified two errors in this analysis. Firstly these data were erroneously based on numbers of procedures as the denominator rather than the number of individuals. The effect of this was small as mortality was determined using data from the 2001 Report. At that time in the Registry's history only a small number of individuals had undergone more than one procedure. The second relates to the inclusion of additional deaths subsequent to the period of analysis which was from Sept 1999 to Dec 2000. As mentioned previously there is a time lag before the NDI obtains complete data. It does however have more recent data that are incomplete. As a consequence it was

possible to identify a number of deaths subsequent to the reporting period. The effect of this was two fold. The crude cumulative mortality for the period ending December 2000 was over estimated. Two-year survivorships as defined by the Kaplan-Meier curves were underestimated. These problems have been addressed in this Report.

Mortality Associated with Hip Replacement

As reported last year the 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. These figures are for all diagnoses including those that are likely to be associated with a high mortality such as malignancy (Table M1 and Graph M1).

As would be anticipated mortality is highest for partial hip replacement. There is a 15-fold increase in crude mortality of primary partial hip procedures over primary total hips (20.6% and 1.4%) as well as the rate per 100 person years (31.7 and 1.95). Furthermore, this difference is not eliminated after adjusting for age and sex; as the difference remains 11-fold (6.83% and 0.60%). The principal diagnosis in this group is fractured neck of femur and as such this group is vastly different with respect to associated co-morbidities and other factors that may contribute to mortality when compared to primary total hip (Table M1 and Graph M1).

There are also differences when comparing different types of partial hip replacement. Cumulative mortality and rate per 100 person years are increased in unipolar monoblock prostheses compared to unipolar modular and bipolar prostheses. In the 2002 Report it was mentioned that it was likely that these differences were related to patient selection. This remains the case as when corrected for age and sex the differences are not as evident (Table M2). There is no difference in mortality when comparing the two types of unipolar monoblock, that is, the Austin Moore and Thompson prostheses (Table M2 and Graph M3).

Of interest is the apparent difference in mortality between primary and revision hip procedures. The crude mortality for primary total hips is 1.4% and for revisions, 3.3%. However, when the effect of age is eliminated in the standardised analysis, the mortality for each type of procedure becomes similar: 0.60% for primary hips and 0.64% for revisions.

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. No deaths have been identified during the period of observation for patellar/trochlear procedures. Mortality is less following unicompartmental knee replacement compared to primary total knee replacement. Revision knee replacement has a higher mortality than primary total knee replacement. This trend is still evident after adjustment for age and sex. As yet however the figures remain too low to establish significance (Table M3).

In this Report we have also examined the mortality data to determine if there is an increased risk associated with undertaking bilateral total knee replacements on the same day compared to a unilateral total knee replacement. The analyses that were performed excluded all diagnosis other than osteoarthritis. Initial results would indicate that the mortality risk associated with these two procedures is the same.

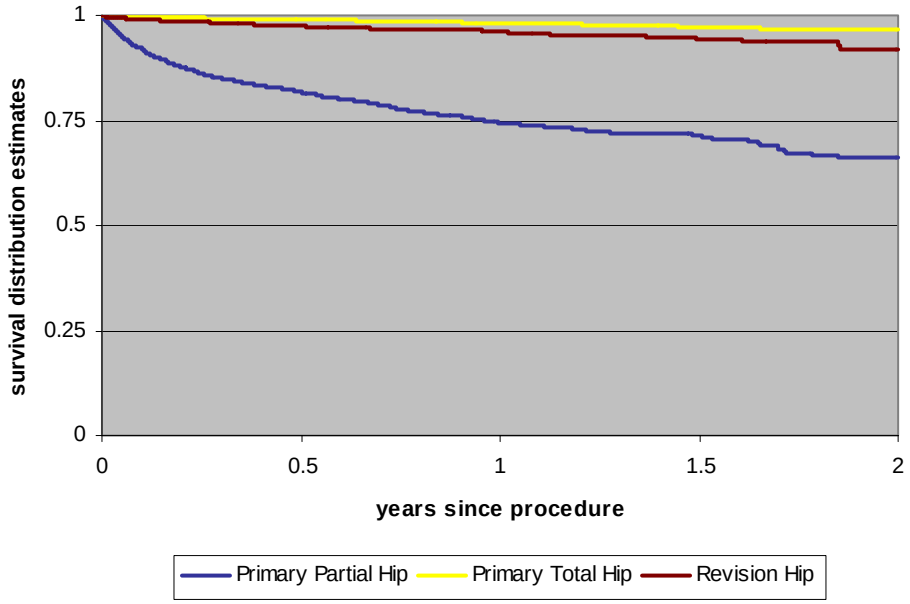
There is however a note of caution in that to determine mortality risk associated with the procedure it is necessary to relate the time of death to the procedure. It is unlikely that death 12 months following knee replacement is specifically related to the procedure, whereas death within six weeks may well be. At this stage the Registry has recorded only four deaths in the first six weeks following same day total knee replacement for osteoarthritis. This figure represents a crude cumulative mortality of 0.32% at six weeks following the procedure and is 25.1% of all deaths that have

occurred following same day bilateral total knee replacement. There are 44 deaths within six weeks following unilateral primary total knee replacement for osteoarthritis. The crude cumulative six-week mortality is 0.15% and represents 11.4% of the deaths following this procedure. 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 January 1999 and December 2001

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 Hips	807	3911	20.6	6.83038	2548	31.67	(29.52, 33.93)
Primary Total Hips	203	14632	1.4	0.59988	10386	1.95	(1.69, 2.24)
Revision Hip	82	2512	3.3	0.64289	1844	4.45	(3.54, 5.52)
Total	**1092**	**21055**	**5.2**	**1.19096**	**14778**	**7.39**	**(6.96,7.84)**

Graph M1: Kaplan-Meier Survival - following Hip Procedure

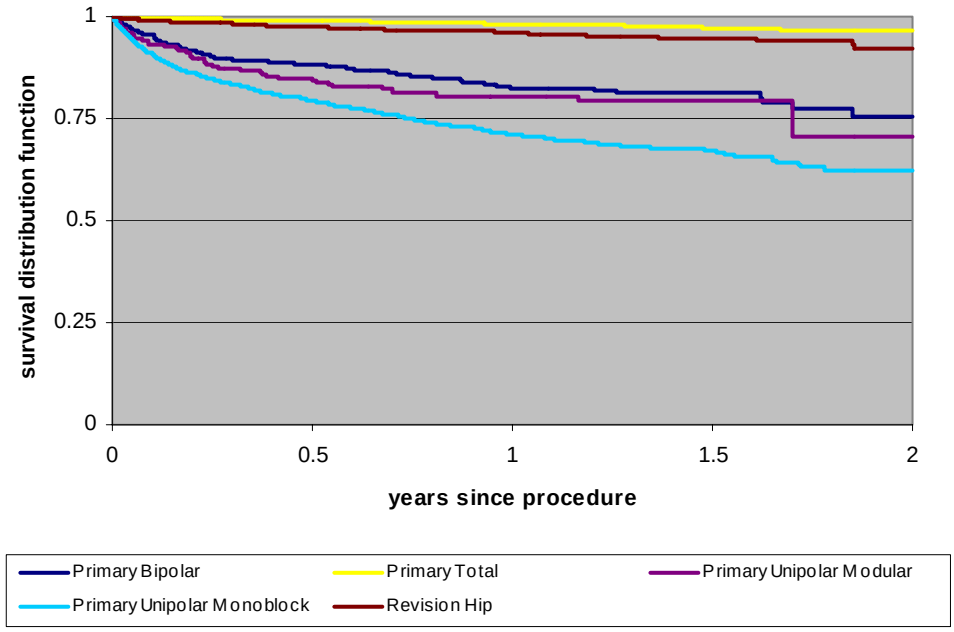


	Number at risk at start of the period				
	0	*0.5*	*1*	*1.5*	*2*
Primary Partial Hip	3911	1966	951	364	125
Primary Total Hip	14632	8424	3837	1363	359
Revision Hip	2512	1477	734	268	69

Table M2: Mortality following Hip Replacement for Hip procedure between January 1999 and December 2001 (Table M1 expanded)

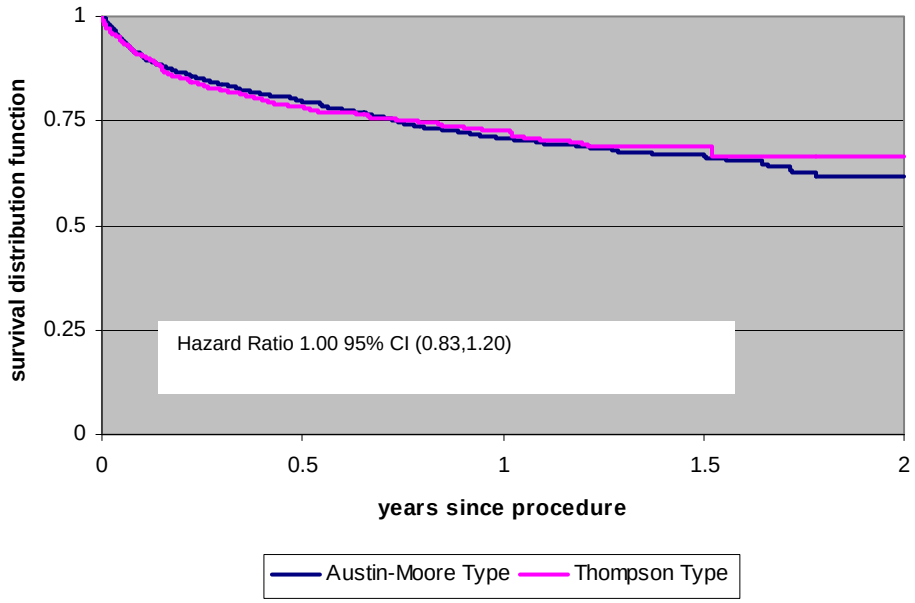
Type of hip replacement	*Number who died*	*Number of patients*	*Cumulative mortality (% who died)*	*Standardised Mortality*	*Person-years*	*Rate per 100 person years*	*Exact 95% CI*
Primary Bipolar	118	871	13.6	5.78205	592	19.93	(16.50, 23.87)
Primary Unipolar Mono	631	2687	23.5	9.49433	1719	36.70	(33.89, 39.68)
Austin-Moore Type	*(481)*	*(2061)*	*(23.3)*	*6.49808*	*(1313)*	*(36.64)*	*(33.43, 40.06)*
Thompson Type	*(150)*	*(626)*	*(24.0)*	*6.88558*	*(406)*	*(36.91)*	*(31.24, 43.31)*
Primary Unipolar Modular	58	353	16.4	6.20776	237	24.47	(18.58, 31.64)
Primary Resurfacing	1	703	0.1	0.03426	360	0.28	(0.01, 1.55)
Primary Thrust Plate	.	37	.	0.00000	29	0.00	(0.00, 12.79)
Primary Total	202	13892	1.5	0.67802	9997	2.02	(1.75, 2.32)
Revision	82	2512	3.3	0.64289	1844	4.45	(3.54, 5.52)
Total	**1092**	**21055**	**5.2**	**1.19096**	**14778**	**7.39**	**(6.96,7.84)**

Graph 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*
Primary Unipolar Monoblock	2687	1322	619	243	98
Primary Bipolar	871	454	236	86	26
Primary Unipolar Modular	353	190	96	35	1
Primary Total	14632	8424	3837	1363	359
Revision	2512	1477	734	268	69

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



	Number at risk at start of the period				
	0	***0.5***	***1***	***1.5***	***2***
Austin Moore Type	2061	993	444	209	98
Thompson Type	626	329	175	34	0

Table M3: Number and percentage of people who died following Knee Replacement for Knee procedure between Jan 1999 and Dec 2001

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	0	71	0	0.00000	57	0.00	(0.00, 6.44)
Unicompartmental	12	2533	0.5	0.11870	1600	0.75	(0.39, 1.31)
Primary Total	185	15231	1.2	0.25715	10888	1.70	(1.46, 1.96)
Revision	30	1688	1.8	0.34001	1330	2.26	(1.52, 3.22)
Total	**227**	**19523**	**1.2**	**0.25364**	**13875**	**1.64**	**(1.43, 1.86)**

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.

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".

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 2 cont.

HEALTH DEPARTMENTS

Health Departments in each state and territory were contacted about validating components of the Registry data. Information outlining the Registry was provided to the director of each department. The following departments have agreed to validate the Registry information on a quarterly basis:

South Australia, Northern Territory, Australian Capital Territory, Tasmania, Victoria, Western Australia and Queensland.

Western Australian Health Department
Access to WA Health Department Data requires authorisation by the Confidentiality of Health Information Committee prior to release. Approval was given on 14th March 2000.

Queensland Health Department
A deed of agreement was negotiated between the AOA and the QLD government through the QLD Health Department. The purpose of this Agreement is to allow hospitals to release information to the Registry.

New South Wales Health Department
Negotiations are ongoing with NSW Health Department.

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