ACORN
Arthroplasty Clinical Outcomes Registry

2013 ANNUAL REPORT

ARTHROPLASTY CLINICAL OUTCOMES REGISTRY

1 JANUARY 2013 to 31 DECEMBER 2013

ACORN
Arthroplasty Clinical Outcomes Registry

Arthroplasty Clinical Outcomes Registry
2013 Annual Report | April 2014

Prepared on behalf of the Steering Committee of the Arthroplasty Clinical Outcomes Registry:

Prof Ian Harris, Committee Chair
Ms Elizabeth Armstrong
Dr Samuel Macdessi
Dr Robert Molnar
Dr Justine Naylor
Ms Juliette Proctor
Dr Rami Sorial
Dr Richard Walker

Arthroplasty Clinical Outcomes Registry
Level 2
Ingham Institute for Applied Medical Research
1 Campbell Street
Liverpool NSW 2170

T: +61 2 8738 9252
F: +61 2 9602 7187
E: arthroplastyregistry@worc.org.au
W: acornregistry.org

Correspondence:
Arthroplasty Clinical Outcomes Registry
Ingham Institute for Applied Medical Research
Locked Bag 7103
Liverpool BC NSW 1871

Suggested citation

Arthroplasty Clinical Outcomes Registry 2014, Arthroplasty Clinical Outcomes Registry 2013 Annual Report, Sydney

ACKNOWLEDGEMENTS

The Arthroplasty Clinical Outcomes Registry would like to acknowledge the funding and in-kind support provided by:

- Whitlam Orthopaedic Research Centre
- Liverpool Hospital Orthopaedic Department, South Western Sydney Local Health District
- South Western Sydney Clinical School, UNSW
- Medicine Computing Support Unit, Faculty of Medicine, UNSW
- Ingham Institute for Applied Medical Research

PARTICIPATING HOSPITALS

Special thanks is extended to the Orthopaedic Departments of the participating hospitals, especially the Site Coordinator's who have taken responsibility for the collection and submission of data and who are vital to the success of ACORN. Thanks are also extended to Joseph Descallar for data analysis and to Shirley Cross for ongoing administrative support.

Hospital	Coordinator	Role
Canterbury Hospital	Jaroslava Janotka	Nurse Unit Manager Ambulatory Care Outpatients Department
Coffs Harbour Health Campus	Andrew Wong	Physiotherapy Orthopaedic Care Coordinator
Fairfield Hospital	Susan Dietsch	Orthopaedic Clinical Nurse Consultant, Orthopaedics
Liverpool Hospital	Christopher Saliba	Senior Outpatients Physiotherapist
Nepean Hospital	Jennifer Smith	Orthopaedic Clinical Nurse Consultant, Surgery and Anaesthetics
Sutherland Hospital	Juliette Proctor	Nurse Unit Manager, Orthopaedics and Surgery

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

EXECUTIVE SUMMARY

The Arthroplasty Clinical Outcomes Registry (ACORN) was established in 2012 to improve the quality and effectiveness of arthroplasty surgery by monitoring, evaluating and reporting clinical outcomes. By producing an Annual Report on the effectiveness of this common and resource-intensive procedure, available for patients, surgeons, and hospital departments, the registry aims to inform future decision-making in order to improve the outcomes after hip and knee arthroplasty surgery.

ACORN covers all hip and knee arthroplasty (replacement) surgery done as an elective procedure in participating institutions. The outcomes measured include general health and region-specific (hip or knee) scores of pain and function. The registry also reports on complications (such as readmission, reoperation, infection and blood clot), patient satisfaction and patient-rated recovery.

Many clinical units see the significant value obtained from the measurement of clinical outcomes for the interventions they provide, and have instituted their own follow up of people who undergo surgery at their units. The value of ACORN is the provision of a standardised and centralised collection of patient-reported outcomes and complications after total joint replacement. The benefit of this method of data collection is that the analysis and reporting from multiple units provides the ability to undertake risk-adjusted comparisons across hospitals.

This report uses data from four institutions. Although ACORN now recruits from more sites, the report is restricted to reporting on sites with outcome data for the 2013 calendar year. The report includes data from 705 people who underwent elective hip and knee replacement surgery. As reflected in other reports, knee replacement outnumbered hip replacements by over two to one. Revision surgeries made up only 6% of all procedures.

Overall, satisfaction and success after hip and knee arthroplasty were high, although people reported higher levels of satisfaction after primary hip arthroplasty compared with knee arthroplasty. There was also substantial improvement in pain and function, as measured by the Oxford Hip or Knee Score, and in the dimensions of health-related quality of life. Overall, these improvements were greater in people who had a primary hip replacement compared to primary knee replacement. However, the proportion of people reporting no problems with mobility, self-care, their usual activities, pain or discomfort, and anxiety or depression, increased after surgery at similar levels for primary hip and knee arthroplasty. Health improvements and satisfaction after revision surgery were less than for primary surgery.

The Annual Report contains only summary data. Risk-adjusted comparisons for each institution are made available to individual departments every six months, and surgeon-level reports are available to participating surgeons as ad hoc reports. Furthermore, statistical analyses of predictors of outcome are currently withheld from the Annual Report.

1. SNAPSHOT OF PARTICIPANTS AND OUTCOMES INCLUDED IN ACORN

27%	had a primary hip replacement; 40% of them were men and 60% were women; the youngest person to have their hip replaced was 29 years and the oldest person was 88 years; their average age was 67 and their average BMI was 30.9.
	96% of people reported the outcome of their hip replacement as excellent, very good, or good; and 96% felt their hip was better than before the operation.
67%	had a primary single knee replacement; 34% were men and 66% were women; the youngest person to have their knee replaced was 41 years old and the oldest person 91 years; the average age was 69 and their average BMI was 33.0.
	88% of people reported the outcome of their knee replacement as excellent, very good, or good; and 91% felt their knee was better than before the operation.
3%	had an existing hip replacement revised; the youngest person to have their hip revised was 41 years and the oldest person was 85 years.
	82% of people reported the outcome of their revision surgery as excellent, very good, or good; and 76% felt their hip was better than before the operation.
3%	had an existing knee replacement revised; the youngest person to have their knee revised was 54 years and the oldest person was 87 years.
	80% of people reported the outcome of their revision surgery as excellent, very good, or good; and 80% felt their knee was better than before the operation.

2. INTRODUCTION

Arthroplasty surgery has been shown to be an effective intervention to improve pain, function, and quality of life in people with severe joint disease of the hip or knee. Since 2003, the number of hip procedures performed in Australia has increased by over 40% and knee procedures by almost 70%[1]. In 2012, almost 70,000 primary total hip and knee replacements were undertaken in Australia, and the vast majority of these surgeries were undertaken in Australia's older population.

Two of the primary reasons for a person to choose hip or knee arthroplasty are increasing pain and deteriorating functional ability. In the Australian context, measurement of the effectiveness of surgery in addressing these indicators is not undertaken in a standardised, systematic way. While patient-reported measures are considered subjective, they constitute the most direct measurement of the achievement of the goals of surgery. Internationally, there has been an increasing emphasis on the inclusion of patient reported outcomes or experiences after hip and knee arthroplasty. Most notably, Sweden, England, New Zealand, and a number of discrete projects within the USA, have developed and implemented methods to measure the impact of arthroplasty from the perspective of the person who has undergone the procedure.

Domestically, the Australian Orthopaedic Association National Joint Replacement Registry (NJRR) is a recognised leader in the surveillance of procedures and implants used in arthroplasty. The NJRR uses revision surgery (reoperation) as the primary indicator of surgical failure and this has led to improvements in surgery by the identification of poorly performing prostheses. It is agreed that avoidance of surgical revision is important, however reoperation does not in itself provide a complete picture of the effectiveness of arthroplasty with respect to relief of pain, functional improvement, and improvements in quality of life for the recipient.

ACORN (The Arthroplasty Clinical Outcomes Registry) was formed to address the gap in clinical outcome measurement after hip and knee arthroplasty, and to use that information to drive improvements in patient outcomes. The outcomes measured by ACORN can be broadly grouped into general health, joint (hip or knee) pain and function, patient-rated satisfaction, and complications.

As this is the first Annual Report, we have established the template for future reporting. We acknowledge that reporting content and style may change as the registry matures, but our aim is to make the report accessible for all stakeholders, particularly the public. We have done this by avoiding medical jargon where possible, and by restricting reporting of statistical methods to the minimum required for an understanding of the data presented.

The Steering Committee and Management Committee were responsible for guiding the development of the policies and procedures that drive ACORN. A systematic approach to data collection and processing has resulted in excellent results in the quality assessments that were performed in 2013, showing 99% data completeness and 95% data accuracy from our contributing sites. Follow-up currently stands at approximately 84%, which is comparable to the Patient Reported Outcome Measures (PROMs) program in England and Wales.

Although negotiations regarding sustainable funding are still ongoing, the work done by the committees that drive ACORN have now established firm foundations on which we hope to build the registry by adding more sites and, later, longer-term outcomes. We look forward to providing larger, more comprehensive reports in future years.

3. BACKGROUND

In 2012, a multidisciplinary team of health care professionals initiated the Arthroplasty Clinical Outcomes Registry project to pilot the feasibility of monitoring, evaluating, and reporting outcomes after hip and knee arthroplasty surgery. The project was titled Arthroplasty Clinical Outcomes Registry (ACORN) to provide a daily reminder of the project vision: an Australian clinical outcomes registry that will be able to provide the person's perspective of their recovery after hip or knee arthroplasty and by doing so, contribute to improved outcomes in the future.

In 2012, existing post-arthroplasty outcomes registries, such as England's PROMs program and the New Zealand Joint Registry, were reviewed as well as other Australian outcome registries and this provided a solid foundation for the development of ACORN. In addition, the recent work of the Australian Commission of Safety and Quality in Health Care in developing National Operating Principles and Technical Standards for Australian Clinical Quality Registries provided guidance towards the development of systematic collection of outcome data after hip and knee arthroplasty. A Steering Committee with defined terms of reference (Appendix 1) was established to oversee the development, implementation, and growth of ACORN. The committee members include arthroplasty surgeons, senior nursing managers, allied health clinicians, and researchers, with processes developed for consultation with consumer organisations and health service executives where required.

The Hunter New England Human Research Ethics Committee (HNE HREC) provided ethics approval for ACORN and site-specific approvals from the relevant Research Governance Offices were received prior to the project commencing at any site. To protect the privacy of participants, all records are securely stored and only accessed by approved staff. In addition, policies and procedures have been developed to ensure complicity with the new Australian Privacy Principles relating to the collection, storage, access to, and use of personal information.

The ACORN initiative has been supported in its first year through the collaborative efforts of several government, non-government, and research organisations. These organisations include UNSW, South Western Sydney Local Health District, Liverpool Hospital Orthopaedic Department, and the Whitlam Orthopaedic Research Centre at the Ingham Institute for Applied Medical Research.

4. HOW DOES ACORN FUNCTION?

4.1 Participation

Hospitals that perform hip and/or knee arthroplasty are eligible to participate in ACORN. Participation is voluntary and in the public sector hospitals, agreement of all surgeons within the orthopaedic department is required as well as in-principle support for the registry from the hospital executive. To assess the feasibility of routine, post-discharge follow-up after a high- volume orthopaedic procedure, six hospitals were included for the first 12-month period.

An opt-off consent process was approved in line with recommendations from the Australian Commission for Safety and Quality in Health Care, and hospitals nominated a specific person to act as the Site Coordinator, responsible for providing patient information sheets to all eligible people, explanation of the purpose of ACORN, and for data collection in the preoperative and perioperative stages of surgery. Eligible participants are identified during the preoperative admission process, which occurs up to eight weeks prior to a persons' admission for surgery, firstly on the principal procedure responsible for admission (Appendix 2) and then secondly on the criteria outlined in Table 1 and Table 2 below.

During the preadmission process, preoperative data is prospectively collected and the Site Coordinator securely stores the data until matched with the perioperative data on completion of a person's admission. The surgeon Head of Orthopaedics and the Site Coordinator determine the data collection process suited to their individual context. This usually requires contributions by two or three clinicians across the continuum of care, with the Coordinator taking overall responsibility for data completeness and accuracy. Site Coordinators forward records to the registry at the end of each calendar month and the records are entered into the registry to enable six-month follow-up to be undertaken.

Table 1: ACORN Inclusion Criteria

1.	Person aged 18 years of age or over
2.	Planned (elective) primary or revision hip or knee replacement
3.	Surgery is undertaken at a hospital participating in ACORN

Table 2: ACORN Exclusion Criteria

1.	Person is under 18 years of age
2.	Surgery is unplanned, such as hip replacement for fracture
3.	Person is cognitively impaired or is unable to understand the process for participation
4.	Surgery is undertaken at a hospital that is not participating in ACORN

4.2 Overview of the Data Set

For each person included in ACORN, the data collected includes:

- Demographic information, which is used for follow up, data quality processes, and any linkage with other data sets;
- Baseline clinical status including co-morbid conditions;
- A condition specific measure of pain and function completed preoperatively and at six- months;
- A generic measure of self-reported health status completed preoperatively and at six- months;
- Questions about the person's experience and impact of surgery;
- Acute surgical recovery and recovery at six months after discharge from hospital.

ACORN does not collect data on the specific types of prosthesis used. Surveillance of the performance of different types of prosthesis is undertaken by the NJRR.

4.3 Data Collection and Verification

Site Coordinator training is provided to ensure consistent, complete, and accurate data collection between sites, and one-to-one onsite training is included as part of the hospital participation process. The Registry Coordinator/ Data Manager provides on-going support for Site Coordinators and each Coordinator is provided with an ACORN Project Manual for ongoing reference.

ACORN has developed processes for checking data completeness and accuracy when sites submit their data centrally. This ensures that the data captured and held by the registry is as complete and accurate as possible. Data quality is assessed on receipt of data from each site. Data fields are checked for completeness and inconsistencies as the data is entered into the registry, and requests for clarification are sent to the appropriate Site Coordinator when necessary. The Registry Coordinator and Site Coordinators liaise to ensure the fields are reviewed and completed. If specific data fields are frequently identified as incomplete or inaccurate, strategies are agreed to improve these issues for future data collection.

As part of the registries data quality processes, all participating sites have a routine audit of submitted data against source documents within the first 12 months of participation. In 2013, 50% of the participating sites had a routine audit completed. 29% of submitted records were chosen at random for comparison with the medical record. An assessor blinded to the submitted data completed the case report form from the paper and electronic medical record. This re-abstracted data was then compared with the submitted data. For both sites, data completeness was greater than 99% and accuracy was evaluated at 94% and 96%. Processes for formal assessment of case ascertainment from each site will be implemented during the second year of ACORN.

4.4 Follow-up Data Collection

Measurement of outcomes after arthroplasty allows us to understand how effective the surgery is in addressing the primary indicators for surgery, that is, pain and functional limitation. It also enables quantification of outcomes, such as pain, function, quality of life, and complications, and allows individuals to report their perception of surgical success and satisfaction, and other perceptions of their recovery.

In determining the tools to be used, consideration was given to data collection tools used by other international registries, as well as acceptability to clinicians and the burden on participants and clinical staff.

The follow up of participants is undertaken by telephone at 6 months (+/- 1 month) by ACORN. The option of using postal follow-up is available, however this is only used after telephone attempts have been exhausted. Six-months was determined as the best balance between stabilised clinical recovery and minimisation of loss to follow-up[2].

The tools used by ACORN are outlined in Table 3 below.

*Table 3: Tools to Measure Outcomes**

Pain and Function Measure	Oxford Hip or Knee Score (OHS, OKS)
Health-Related Quality of Life	EuroQol Health-Related Quality of Life: 5 Dimensions and Visual Analogue Scale (VAS)
Satisfaction and Success	UK PROMs satisfaction and success questions
Person Perceived Problems	Readmission, Reoperation, Complications

**Permissions have been received for the use of these outcome measures*

4.5 Achievements in 2013

The first 12-months of ACORN has seen an intense level of activity to develop and implement the project at the foundation sites. Evaluation of the implementation process has been ongoing and highlights of the first year include:

- Development of a Minimum Data Set and associated Data Dictionary to standardise data collection;
- Development of a data collection and data submission processes that minimises burden on site coordinators and accommodates variation across sites, but still results in high levels of data quality;
- Investigation and implementation of a database to manage the storage of information;
- Orthopaedic departments (surgeons, nurses, physio-therapists, administrative staff) working together, driven by a desire to improve the clinical outcomes for people having hip and knee arthroplasty;
- Policies and procedures to address access to and use of data.

In addition to these achievements, ACORN undertook a number of associated activities during the year to publicise the registry and seek feedback on the implementation of outcome measurement after arthroplasty. These are listed in Table 4 below.

Table 4: Publications, Presentations, and Projects in 2013

Forum	Presenter	Date	Title
Australian Orthopaedic Association, NSW Branch Annual Scientific Meeting	IA Harris	23 August 2013	ACORN: What is it and why do we need it?
Australian Orthopaedic Association Annual Scientific Meeting	IA Harris	6-9 October 2013	ACORN: What is it and why do we need it?
UNSW Australia, Faculty of Medicine Independent Learning Project	K Seagrave	October 2013	Data quality audit of the Arthroplasty Clinical Outcomes Registry NSW
UNSW Australia, Faculty of Medicine Independent Learning Project	KM Leong	October 2013	Ensuring credibility - the application of interrater reliability in clinical registry data collection: Do differences in clinical experience matter?

4.6 Funding

The Whitlam Orthopaedic Research Centre and the South Western Sydney Clinical School of UNSW provide funding for ACORN. In-kind support is provided by UNSW (Faculty of Medicine), the Ingham Institute for Applied Medical Research, South Western Sydney Local Health District, and the NSW Health Districts in which ACORN is currently piloting.

Committee members are not paid. Intellectual property developed by ACORN is available to others without cost.

4.7 Future Directions

The initial year of ACORN supports the feasibility of follow-up after high volume orthopaedic surgery. Although costs are low, changes to the funding model may be required in order to support the continued expansion into other centres.

Looking ahead to the second year, ACORN will continue to implement data quality processes to monitor completeness of cases, and data linkage for mortality after discharge. There is also the opportunity to trial alternative methods of follow-up that will improve the rate of completion whilst maintaining reliability, and have positive implications for resource allocation and participant useability. Of importance, ACORN needs to address the rate of follow-up of people from Non-English Speaking Backgrounds (NESB). While loss to follow-up is ~10% in those who speak English, the rate of loss to follow-up in participants from NESB is ~44%.

As 6-month outcomes have been shown to be predictive of later outcomes, it is intended that ACORN will collect 5-year follow up of patients, possibly using random sampling, to provide information on longer term clinical outcomes.

4.8 Coverage in 2013

*Table 5: Coverage in 2013**

	Operated 01.07.2012 to 30.06.2013	Followed up 01.01.2013 to 31.12.2013	Lost to follow up 01.01.2013 to 31.12.2013
	N (% of total operated)	N (% of total operated)	N (% of total operated)
Hips, primary	187 (26.5)	166 (23.5)	21 (3.0)
Hips, revision	19 (2.7)	17 (2.4)	2 (0.3)
Knees, primary	473 (67.1)	385 (54.6)	88 (12.5)
Knees, bilateral	6 (0.9)	6 (0.9)	0 (0.0)
Knees, revision	20 (2.8)	15 (2.1)	5 (0.7)
TOTAL	**705 (100)**	**589 (83.5)**	**116 (16.5)**

**Data was collected from four (4) hospitals and follow up of all participants undertaken centrally at six months after date of surgery.*

5. DEMOGRAPHIC PROFILE

5.1 Hip Replacement

Hip replacements are either an initial (index) procedure on a joint, or they are a subsequent (revision) surgery on a previously replaced joint. ACORN collects information on primary total hip replacements and revision hip replacements. A primary total hip replacement involves replacing both surfaces of the hip joint and revision hip replacement surgery is where one or more of the components are removed and/or replaced. ACORN only collects information on elective primary and revision total hip replacement procedures.

In 2013, of those included in ACORN, primary total hip replacement surgery accounted for 91% of hip replacement procedures. The average age of all people having a hip procedure was 67 years. The most common reason for primary surgery was osteoarthritis. Hip replacement surgery was more common in women (59.7%). ACORN followed up 89% of people who had undergone a hip replacement and who were included in the registry.

5.1.1 Age

Table 5.1: Primary Hip Replacement: Age by Gender

Primary Hips	Age in Years (N = 187)					Age Categories (%)				
	N (%)	Mean	SD	Min	Max	<55	55-64	65-74	75-84	>85
Male	75 (40)	64.8	13.1	29	87	20.3	21.6	32.4	20.3	5.4
Female	112 (60)	68.5	10.9	39	88	14.3	19.6	29.5	35.7	0.9
TOTAL	**187 (100)**	**67.0**	**11.9**	**29**	**88**	**16.7**	**20.4**	**30.6**	**29.6**	**2.7**

Table 5.2: Revision Hip Replacement: Age by Gender

Revision Hips	Age in Years (N = 19)					Age Categories (%)				
	N (%)	Mean	SD	Min	Max	<55	55-64	65-74	75-84	>85
Male	8 (42)	69	12.3	41	81	13	13	50	25	0
Female	11 (58)	66	12.4	43	85	18	9	64	0	9
TOTAL	**19 (100)**	**67**	**12.1**	**41**	**85**	**16**	**11**	**58**	**11**	**4**

5.1.2 BMI

Table 5.3: Primary Hip Replacement: BMI by Gender

Primary Hips	BMI (N = 187)				
	N (%)	Mean	SD	Min	Max
Male	75 (40)	31.1	6.1	20.4	47.8
Female	112 (60)	30.7	7.0	15.6	47.8
TOTAL	**187 (100)**	**30.9**	**6.6**	**15.6**	**47.8**

Table 5.4: Revision Hip Replacement: BMI by Gender

Revision Hips	BMI (N = 19)				
	N (%)	Mean	SD	Min	Max
Male	8	30	3.98	25	36
Female	11	27	6.1	22	42
TOTAL	**19 (100)**	**28**	**5.5**	**22**	**42**

5.1.3 English Proficiency

Table 5.5: Primary Hip Replacement: English Proficiency by Gender

Primary Hips	English Proficiency (N = 187)	
	High N (%)	Low N (%)
Male	67 (89.3)	8 (10.7)
Female	101 (90.2)	11 (9.8)
TOTAL	**168 (89.8)**	**19 (10.2)**

Table 5.6: Revision Hip Replacement: English Proficiency by Gender

Revision Hips	English Proficiency (N = 19)	
	High N %)	Low N (%)
Male	8 (100)	0 (0)
Female	11 (100)	0 (0)
TOTAL	**19 (100)**	**0 (0)**

5.1.4 Level of Education

Table 5.7: Primary Hip Replacement: Education by Gender

Primary Hips	Level of Education (N = 178)				
	No school N (%)	Year 8 or below N (%)	Year 9 or 10 N (%)	Year 11 or 12 N (%)	Any non-school qualification N (%)
Male	3 (4.2)	6 (8.3)	32 (44.4)	13 (18.1)	18 (25.0)
Female	1 (0.9)	12 (11.3)	46 (43.4)	29 (27.4)	18 (16.9)
TOTAL	**4 (2.2)**	**18 (10.1)**	**78 (43.8)**	**42 (23.6)**	**36 (20.2)**

Table 5.8: Revision Hip Replacement: Education by Gender

Revision Hips	Level of Education (N = 17)				
	No school N (%)	Year 8 or below N (%)	Year 9 or 10 N (%)	Year 11 or 12 N (%)	Any non-school qualification N (%)
Male	0	1 (14)	3 (44)	2 (18)	1 (14)
Female	0	1 (10)	4 (43)	4 (27)	1 (10)
TOTAL	**0 (0.0)**	**2 (12)**	**7 (41)**	**6 (35)**	**2 (12)**

5.1.5 Co-morbid Conditions

Table 5.9: Primary Hip Replacement: Co-morbidities by Gender

Primary Hips	Number of Co-morbidities (N = 182)			
	0 N (%)	1 N (%)	2 N (%)	≥3 N (%)
Male	12 (16.8)	25 (34.7)	22 (30.6)	13 (18.1)
Female	8 (7.3)	25 (22.7)	41 (37.3)	36 (32.7)
TOTAL	**20 (10.8)**	**50 (27.5)**	**63 (34.6)**	**49 (26.9)**

Table 5.10: Revision Hip Replacement: Co-morbidities by Gender

Revision Hips	Number of Co-morbidities (N = 18)			
	0 N (%)	1 N (%)	2 N (%)	≥3 N (%)
Male	0 (0)	1 (14)	4 (57)	2 (29)
Female	3 (27)	4 (36)	1 (9)	3 (27)
TOTAL	**3 (17)**	**5 (28)**	**5 (28)**	5 (28)

5.1.6 Reason for Surgery

Table 5.11: Primary Hip Replacement: Reason for Surgery by Gender

Primary Hips	Reason for Surgery (N = 119)					
	Osteoarthritis N (%)	RA N (%)	DDH N (%)	Osteonecrosis/AVN N (%)	Tumour N (%)	Other N (%)
Male	45 (83)	0 (0)	1 (2)	7 (13)	0 (0)	1 (2)
Female	61 (94)	1 (2)	2 (3)	0 (0)	0 (0)	1 (2)
TOTAL	**106 (89)**	**1 (1)**	**3 (3)**	**7 (6)**	**0 (0)**	**2 (2)**

Table 5.12: Revision Hip Replacement: Reason for Surgery by Gender

Revision Hips	Reason for Surgery (N = 12)						
	Loosening N (%)	Dislocation N (%)	Lysis N (%)	Implant breakage N (%)	Infection N (%)	Fracture N (%)	Other N (%)
Male	5 (83)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (17)
Female	2 (33)	2 (33)	1 (17)	0 (0)	0 (0)	0 (0)	1 (17)
TOTAL	**7 (58)**	**2 (17)**	**1 (8)**	**0 (0)**	**0 (0)**	**0 (0)**	2 (17)

5.2 Knee Replacement

Knee replacements are either an initial (or index) procedure on a joint, or they are a subsequent (revision) procedure on a previously replaced joint. ACORN collects information on primary total or partial (hemi-arthroplasty) knee replacements and revision knee replacements. A primary total knee replacement involves replacing both surfaces of the knee joint with or without resurfacing of the patella, and a partial replacement involves replacement of only part of the joint. Revision knee replacement surgery is where one or more of the components are removed and/or replaced.

In 2013, of those included in ACORN, primary total knee replacement surgery accounted for 96% of knee replacement procedures. The average age of all people having a knee procedure was 69 years. The most common reason for primary surgery was osteoarthritis. Knee replacement surgery was more common in women (63.9%). ACORN followed up 81% of people who had undergone a knee replacement and who were included in the registry.

5.2.1 Age

Table 5.13: Primary Knee Replacement: Age by Gender

Primary Knees	Age in Years (N = 473)					Age Categories (%)				
	N (%)	Mean	SD	Min	Max	<55	55-64	65-74	75-84	>85
Male	163 (34)	69.2	9.6	44	91	9.9	17.3	42.6	25.9	4.3
Female	310 (66)	68.5	8.9	41	91	7.7	24.2	41.0	25.2	1.9
TOTAL	**473 (100)**	**68.7**	**9.1**	**41**	**91**	**8.5**	**21.9**	**41.6**	**25.3**	**2.7**

Table 5.14: Revision Knee Replacement: Age by Gender

Revision Knees	Age in Years (N = 20)					Age Categories (%)				
	N (%)	Mean	SD	Min	Max	<55	55-64	65-74	75-84	>85
Male	11 (55)	67	9.8	58	87	0	46	27	18	9
Female	9 (45)	69	10.4	54	84	11	22	33	33	0
TOTAL	**20 (100)**	**68**	**9.9**	**54**	**87**	**5**	**35**	**30**	**25**	**5**

5.2.2 BMI

Table 5.15: Primary Knee Replacement: BMI by Gender

Primary Knees		BMI (N = 473)			
	N (%)	Mean	SD	Min	Max
Male	163 (34)	31.7	5.8	19.2	53.9
Female	310 (66)	34.3	7.3	19.1	62.9
TOTAL	**473 (100)**	**33.4**	**6.9**	**19.1**	**62.9**

Table 5.16: Revision Knee Replacement: BMI by Gender

Revision Knees		BMI (N = 20)			
	N (%)	Mean	SD	Min	Max
Male	11 (55)	30	4.9	25	42
Female	9 (45)	30	5.0	23	38
TOTAL	**20 (100)**	**30**	**4.8**	**23**	**42**

5.2.3 English Proficiency

Table 5.17: Primary Knee Replacement: English Proficiency by Gender

Primary Knees	English Proficiency (N = 473)	
	High N (%)	Low N (%)
Male	136 (83.4)	27 (16.6)
Female	233 (75.2)	77 (24.8)
TOTAL	**369 (78.0)**	104 (22.0)

Table 5.18: Revision Knee Replacement: English Proficiency by Gender

Revision Knees	English Proficiency (N = 20)	
	High N (%)	Low N (%)
Male	10 (91)	1 (9)
Female	9 (100)	0 (0)
TOTAL	**19 (95)**	1 (5)

5.2.4 Level of Education

Table 5.19: Primary Knee Replacement: Education by Gender

Primary Knees	Level of Education (N = 445)				
	No school N (%)	Year 8 or below N (%)	Year 9 or 10 N (%)	Year 11 or 12 N (%)	Any non-school qualification N (%)
Male	2 (1.3)	21 (14.0)	57 (38.0)	47 (31.3)	23 (15.3)
Female	12 (4.1)	45 (15.3)	128 (43.4)	64 (21.7)	46 (15.6)
TOTAL	**14 (3.2)**	**66 (14.8)**	**185 (41.6)**	**111 (24.9)**	**69 (15.5)**

Table 5.20: Revision Knee Replacement: Education by Gender

Revision Knees	Level of Education (N = 19)				
	No school N (%)	Year 8 or below N (%)	Year 9 or 10 N (%)	Year 11 or 12 N (%)	Any non-school qualification N (%)
Male	0 (0)	0 (0)	2 (18)	6 (55)	3 (27)
Female	0 (0)	2 (25)	4 (50)	2 (25)	0 (0)
TOTAL	**0 (0)**	**2 (11)**	**6 (32)**	**8 (42)**	**3 (16)**

5.2.5 Co-morbid Conditions

Table 5.21: Primary Knee Replacement: Co-morbidities by Gender

Primary Knees	Number of Co-morbidities (N = 467)			
	0 N (%)	1 N (%)	2 N (%)	≥3 N (%)
Male	11 (6.8)	39 (24.2)	59 (36.7)	52 (32.3)
Female	20 (6.5)	84 (27.5)	118 (38.6)	84 (27.5)
TOTAL	**31 (6.6)**	**123 (26.3)**	**177 (37.9)**	**136 (29.1)**

Table 5.22: Revision Knee Replacement: Co-morbidities by Gender

Revision Knees	Number of Co-morbidities (N = 19)			
	0 N (%)	1 N (%)	2 N (%)	≥3 N (%)
Male	1 (10)	3 (30)	2 (20)	4 (40)
Female	0 (0)	3 (33)	2 (22)	4 (44)
TOTAL	**1 (5)**	**6 (32)**	**4 (21)**	**8 (42)**

5.2.6 Reason for Surgery

Table 5.23: Primary Knee Replacement: Reason for Surgery by Gender

Primary Knees	Reason for Surgery (N = 311)					
	OA N (%)	RA N (%)	DDH N (%)	Osteonecrosis/ AVN N (%)	Tumour N (%)	Other N (%)
Male	101 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Female	209 (99.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.5)
TOTAL	**310 (99.7)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	1 (0.3)

Table 5.24: Revision Knee Replacement: Reason for Surgery by Gender

Revision Knees	Reason for Surgery (N = 7)						
	Loosening N (%)	Dislocation N (%)	Lysis N (%)	Implant breakage N (%)	Infection N (%)	Fracture N (%)	Other N (%)
Male	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (100)
Female	4 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL	**4 (57)**	**0 (0)**	**0 (0)**	**0 (0)**	**0 (0)**	**0 (0)**	3 (43)

6. Acute Care Measures

During the admitted period of care, the specific measures of interest were: any requirement for a high care bed and whether this was a planned or unplanned admission; any complications experienced during the admitted acute care stay; the need for a blood transfusion; and discharge destination from the acute ward.

Complications are required to have been documented in the medical record. They include delirium, surgical site infection, DVT, PE, respiratory infection, cardiovascular events, dislocation, fracture, nerve injury, bladder infection or retention, wound dehiscence, or death.

6.1 Hip Replacement

6.1.1 High Care Bed

Table 6.1: Primary Hip Replacement: High Care Bed by Gender

Primary Hips (N = 186)	High Care Bed	Unplanned High Care Bed
	N (%)	N (%)
Male	9 (12.2)	0 (0.0)
Female	6 (5.4)	0 (0.0)
TOTAL	**15 (8.1)**	**0 (0.0)**

Table 6.2: Revision Hip Replacement: High Care Bed by Gender

Revision Hips (N = 19)	High Care Bed	Unplanned High Care Bed
	N (%)	N (%)
Male	1 (13)	0 (0)
Female	0 (0)	0 (0)
TOTAL	**1 (5)**	**0 (0)**

6.1.2 Transfusion

Table 6.3: Primary Hip Replacement: Transfusion by Gender

Primary Hips	Transfusion (N = 186)		
	Transfused N (%)	Units transfused Mean	SD
Male	6 (8.0)	1.8	0.8
Female	30 (27.0)	2.0	0.9
TOTAL	**36 (19.4)**	**1.9**	**0.8**

Table 6.4: Revision Hip Replacement: Transfusion by Gender

Revision Hips	Transfusion (N = 19)		
	Transfused N (%)	Units transfused Mean	SD
Male	2 (25)	2	0.0
Female	3 (27)	2	0.6
TOTAL	**5 (26)**	**2**	**0.4**

6.1.3 Complications During Index Admission

Table 6.5: Primary Hip Replacement: Any Complication During Index Admission by Gender

Primary Hips	Complications (N = 186)	
	Yes N (%)	No N (%)
Male	9 (12.2)	65 (87.8)
Female	11 (9.9)	100 (90.1)
TOTAL	**20 (10.8)**	**165 (88.7)**

Table 6.6: Revision Hip Replacement: Any Complication During Index Admission by Gender

Revision Hips	Complications (N = 19)	
	Yes N (%)	No N (%)
Male	4 (50)	4 (50)
Female	1 (9)	10 (91)
TOTAL	**5 (26)**	**14 (74)**

6.1.4 Length of Stay

Table 6.7: Primary Hip Replacement: Length of Stay by Gender

Primary Hips		Length of Stay (days) (N = 187)	
	N (%)	Mean	SD
Male	75 (40.1)	5.3	2.9
Female	112 (59.9)	5.5	2.2
TOTAL	187 (100)	5.4	2.5

Table 6.8: Revision Hip Replacement: Length of Stay by Gender

Revision Hips		Length of Stay (days) (N = 19)	
	N (%)	Mean	SD
Male	8 (42)	10	8.5
Female	11 (58)	7	2.7
TOTAL	19 (100)	8	5.9

6.1.5 Discharge Destination

Table 6.9: Primary Hip Replacement: Discharge Destination by Gender

Primary Hips	Discharge Destination (N = 185)	
	Usual residence N (%)	Inpatient rehab same hospital N (%)
Female	61 (82.4)	13 (17.6)
Male	82 (73.9)	29 (26.1)
TOTAL	143 (77.3)	42 (22.7)

Table 6.10: Revision Hip Replacement: Discharge Destination by Gender

Revision Hips	Discharge Destination (N = 19)	
	Usual residence N (%)	Inpatient rehab same hospital N (%)
Female	7 (78)	2 (22)
Male	6 (60)	4 (40)
TOTAL	13 (68)	6 (32)

6.2 Knee Replacement

6.2.1 High Care Bed

Table 6.11: Primary Knee Replacement: High Care Bed by Gender

Primary Knees (N = 469)	High Care Bed	Unplanned High Care Bed
	N (%)	N (%)
Male	9 (12.2)	0 (0.0)
Female	6 (5.4)	0 (0.0)
TOTAL	15 (8.1)	0 (0.0)

Table 6.12: Revision Knee Replacement: High Care Bed by Gender

Revision Knees (N = 19)	High Care Bed	Unplanned High Care Bed
	N (%)	N (%)
Male	0 (0)	0 (0)
Female	1 (11)	0 (0)
TOTAL	1 (5)	0 (0)

6.2.2 Transfusion

Table 6.13: Primary Knee Replacement: Transfusion by Gender

Primary Knees	Transfusion (N = 469)		
	Transfused N (%)	Units transfused Mean	SD
Male	15 (9.3)	2.3	1.2
Female	46 (14.9)	2.0	0.6
TOTAL	61 (13.0)	2.1	0.8

Table 6.14: Revision Knee Replacement: Transfusion by Gender

Revision Knees	Transfusion (N = 20)		
	Transfused N (%)	Units transfused Mean	SD
Male	3 (27)	1	1.2
Female	4 (44)	2	1.3
TOTAL	7 (35)	2	1.2

6.2.3 Complications During Index Admission

Table 6.15: Primary Knee Replacement: Any Complication During Index Admission by Gender

Primary Knees	Complications (N = 469)	
	Yes N (%)	No N (%)
Male	20 (12.3)	143 (87.7)
Female	43 (14.1)	263 (86.0)
TOTAL	**63 (13.4)**	**406 (86.6)**

Table 6.16: Revision Knee Replacement: Any Complication During Index Admission by Gender

Revision Knees	Complications (N = 20)	
	Yes N (%)	No N (%)
Male	2 (10)	9 (45)
Female	1 (5)	8 (40)
TOTAL	**3 (15)**	**17 (85)**

6.2.4 Length of Stay

Table 6.17: Primary Knee Replacement: Length of Stay by Gender

Primary Knees	Length of Stay (days) (N = 473)		
	N (%)	Mean	SD
Male	163 (34.5)	5.5	3.2
Female	310 (65.5)	5.5	2.4
TOTAL	**473 (100)**	**5.5**	**2.7**

Table 6.18: Revision Knee Replacement: Length of Stay by Gender

Revision Knees	Length of Stay (days) (N = 20)		
	N (%)	Mean	SD
Male	11 (55)	5.6	3.2
Female	9 (45)	4.9	2.5
TOTAL	**20 (100)**	**5.3**	**2.8**

6.2.5 Discharge Destination

Table 6.19: Primary Knee Replacement: Discharge Destination by Gender

Primary Knees	Discharge Destination (N = 472)		
	Usual residence N (%)	Inpatient rehab same hospital N (%)	Other N (%)
Male	127 (78.4)	34 (21.0)	1 (0.6)
Female	199 (64.2)	105 (33.9)	6 (1.9)
TOTAL	**326 (69.1)**	**139 (29.4)**	**7 (1.5)**

Table 6.20: Revision Knee Replacement: Discharge Destination by Gender

Revision Knees	Discharge Destination (N = 20)		
	Usual residence N (%)	Inpatient rehab same hospital N (%)	Other N (%)
Male	7 (64)	4 (36)	0 (0)
Female	6 (67)	3 (33)	0 (0)
TOTAL	**13 (65)**	**7 (35)**	**0 (0)**

7. Patient-Reported Outcome Measures

Patient-reported outcome measures (PROMs) are measures of health status at a particular point in time collected directly from the person. In ACORN, they provide a personal perspective of the impact of surgery by comparing health status at two different points in time, therefore allowing comparison of not only clinical measures but also the perceptions of the individual[3].

Since March 2013, ACORN has included measures of the individual's expectations from surgery. Prior to admission, each person is asked "what are your expectations of your hip/knee pain six months after your surgery?" and "what are your expectations of your functional ability six months after your surgery?" At follow-up, questions to measure perceived satisfaction and success are asked. These replicate the questions used by the PROMs programme in England and Wales. They have been incorporated into ACORN's postoperative follow up with permission.

For satisfaction, the question asked is *"how would you describe the results of your operation?"* with five options provided: excellent; very good; good; fair; or poor.

For success, the question asked is *"overall, how are the problems now with your hip/knee on which you had surgery, compared to before your operation?"* This question also allows the person to choose one of five options: much better; a little better; about the same; a little worse; and much worse.

In addition, ACORN asks participants whether they have been readmitted to hospital since discharge, had another operation on the joint that was replaced six months earlier, and asked whether they have experienced any other problem not requiring readmission or reoperation. By asking this additional question about problems not requiring readmission or reoperation, ACORN is able to capture those outcomes that continue to impact the individual, or have resulted in additional services being utilised in the primary or community care setting, although not sufficient for additional utilisation of admitted hospital services.

The Oxford Hip Score (OHS)[4] and the Oxford Knee Score (OKS)[5] are 12-item, person-reported tools developed to assess pain and function in people undergoing hip or knee replacement. The questionnaires explore a person's perception of their pain and functional impairment in tasks of daily living over the previous 4 weeks. The least difficulty undertaking tasks or the least severity of symptoms scores four points, and the most severe symptoms and dysfunction scores zero. The individual scores are summed to achieve a single score with the highest attainable score of 48, which means a person perceives no functional impairment and no pain. The lowest score of 0 means the person has severe pain and functional impairment as a result of their joint problems. In reporting the Oxford Hip and Knee Scores, outcomes were grouped into four score categories[6] as reported by the New Zealand Joint Registry[7].

The EQ-5D-5L is a descriptive system of five dimensions of a person's general health. The dimensions are mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. Each dimension has 5 levels: no problems, slight problems, moderate problems, severe problems, or extreme problems. A person is asked to indicate his/her health state by choosing the most appropriate statement in each of the 5 dimensions, on the day the survey is administered.

The EQ-VAS records a person's self-rated health on a 20cm vertical scale with 0 at the bottom representing 'worst health imagined' and 100 at the top representing 'best health imagined'.

7.1 Hip Replacement

7.1.1 Expectations of Recovery

Table 7.1: Primary Hip Replacement: Expectation of Pain at 6-months by Gender

Primary Hips	Expectation of Pain at 6-months (N = 44)			
	No pain N (%)	Slight pain N (%)	Moderate pain N (%)	Severe pain N (%)
Male	12 (52)	9 (39)	2 (9)	0 (0)
Female	10 (48)	10 (48)	1 (5)	0 (0)
TOTAL	**22 (50)**	**19 (43)**	**3 (7)**	**0 (0)**

Table 7.2: Primary Hip Replacement: Expectation of Functional Ability at 6-months by Gender

Primary Hips	Expectation of Functional Ability at 6-months (N = 44)			
	No limitation N (%)	Slight limitation N (%)	Moderate limitation N (%)	Severe limitation N (%)
Male	11 (48)	12 (52)	0 (0)	0 (0)
Female	9 (43)	12 (57)	0 (0)	0 (0)
TOTAL	**20 (46)**	**24 (55)**	**0 (0)**	**0 (0)**

7.1.2 Satisfaction and Success

Table 7.3: Primary Hip Replacement: Satisfaction at 6-months by Gender

Primary Hips	Satisfaction (N = 164)				
	Excellent N (%)	Very Good N (%)	Good N (%)	Fair N (%)	Poor N (%)
Male	36 (57.1)	18 (28.6)	7 (11.1)	1 (1.6)	1 (1.6)
Female	56 (55.4)	27 (26.7)	14 (13.9)	2 (2.0)	2 (2.0)
TOTAL	**92 (56.1)**	**45 (27.4)**	**21 (12.8)**	**3 (1.8)**	**3 (1.8)**

Table 7.4: Primary Hip Replacement: Success at 6-months by Gender

Primary Hips	Success (N = 164)				
	Much better N (%)	A little better N (%)	About the same N (%)	A little worse N (%)	Much worse N (%)
Male	57 (90.5)	3 (4.8)	2 (3.2)	0 (0.0)	1 (1.6)
Female	85 (84.2)	12 (11.9)	3 (3.0)	0 (0.0)	1 (1.0)
TOTAL	**142 (86.6)**	**15 (9.1)**	**5 (3.0)**	**0 (0.0)**	**2 (1.2)**

Table 7.5: Revision Hip Replacement: Satisfaction at 6-months by Gender

Revision Hips	Satisfaction (N = 17)				
	Excellent N (%)	Very Good N (%)	Good N (%)	Fair N (%)	Poor N (%)
Male	3 (43)	1 (14)	0 (0)	1 (14)	2 (29)
Female	3 (30)	4 (40)	3 (30)	0 (0)	0 (0)
TOTAL	**6 (35)**	**5 (29)**	**3 (18)**	**1 (6)**	**2 (12)**

Table 7.6: Revision Hip Replacement: Success at 6-months by Gender

Revision Hips	Success (N = 17)				
	Much better N (%)	A little better N (%)	About the same N (%)	A little worse N (%)	Much worse N (%)
Male	3 (43)	2 (29)	0 (0)	0 (0)	2
Female	6 (60)	2 (20)	2 (20)	0 (0)	0 (0)
TOTAL	**9 (53)**	**4 (24)**	**2 (12)**	**0 (0)**	**2 (12)**

7.1.3 Reported Recovery

Table 7.7: Hip Replacement: Person Reported Recovery at 6-months

All Hips	Reported Recovery	
	Readmission N (%)	Reoperation N (%)
Primary Hips (N = 166)	15 (9)	4 (2)
Revision Hips (N = 17)	2 (12)	2 (12)

7.1.4 Complications Not Requiring Readmission or Reoperation

Table 7.8: Hip Replacement: Any Complication Reported Since Discharge

All Hips	Any Complication* Reported Since Discharge	
	Yes N (%)	No N (%)
Primary Hips (N = 166)	24 (14.5)	142 (85.5)
Revision Hips (N = 17)	1 (6)	16 (94)

**Type of complication reported includes unexpected pain at 6-months (N = 10), prescribed oral or IV antibiotics since discharge (N = 3), and N < 5 reported the following problems: ongoing joint stiffness; a cardiovascular event; VTE (either DVT or PE); ongoing paraesthesia/ anaesthesia; muscle weakness causing functional impairment; neuropathy; a leg length discrepancy; or cellulitis. A person may report more than one complication.*

7.1.5 Oxford Hip Scores

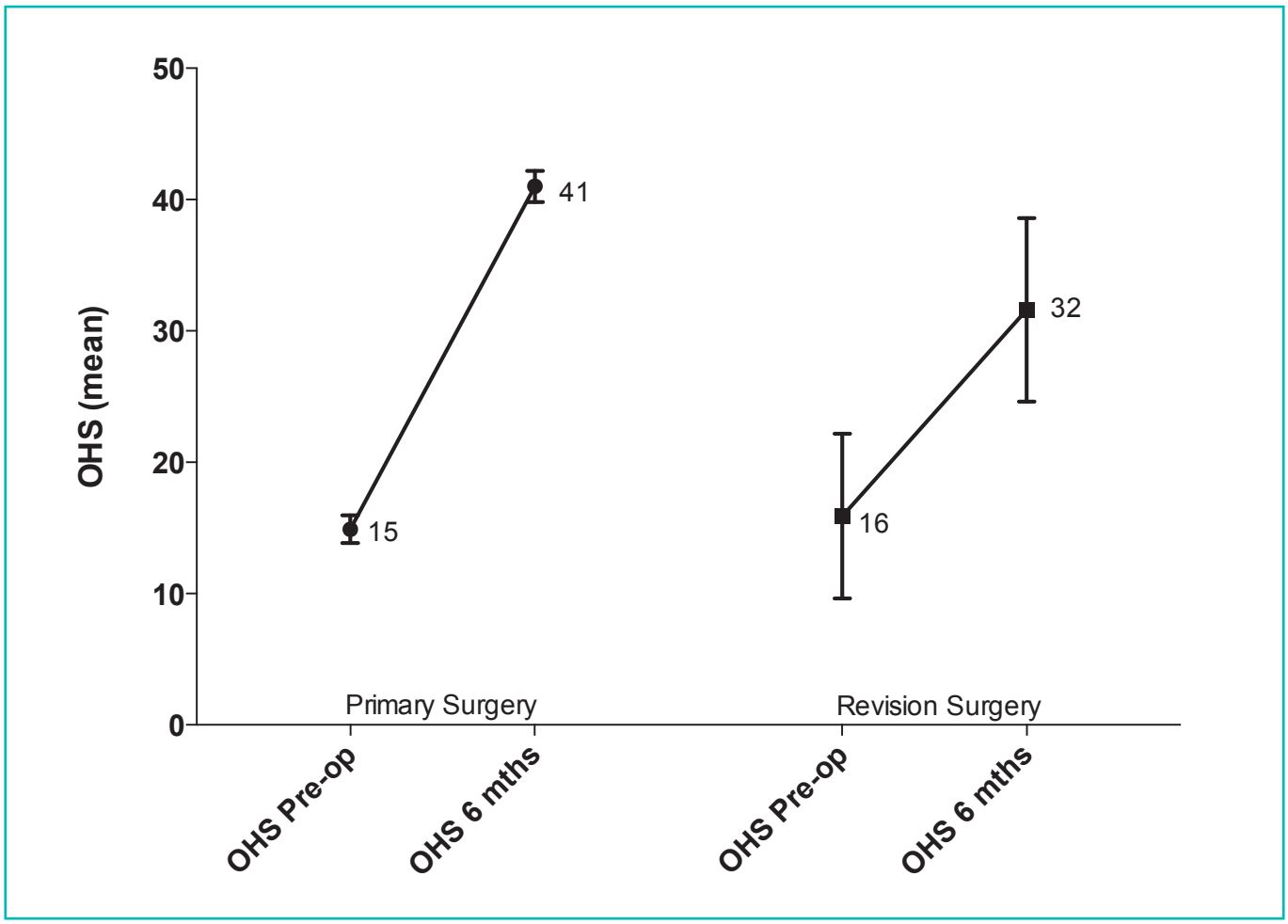
Table 7.9: Primary Hip Replacement: Oxford Hip Score Responses

Primary Hips	OHS Responses Primary Surgery							
	Poor (<27) N (%)	Fair (27-33) N (%)	Good (34-41) N (%)	Excellent (>41) N (%)	Min	Max	Mean	SD
Preoperative Responses (N = 177)	164 (92.7)	10 (5.6)	3 (1.7)	0 (0.0)	0	39	15	7.2
Postoperative Responses (N = 150)	10 (6.7)	9 (6.0)	38 (25.3)	93 (62.0)	13	48	41	7.4

Table 7.10: Revision Hip Replacement: Oxford Hip Score Responses

Revision Hips	OHS Responses Revision Surgery							
	Poor (<27) N (%)	Fair (27-33) N (%)	Good (34-41) N (%)	Excellent (>41) N (%)	Min	Max	Mean	SD
Preoperative Responses (N = 15)	13 (87)	0 (0)	1 (7)	1 (7)	3	42	16	11.3
Postoperative Responses (N = 16)	5 (31)	2 (13)	4 (25)	5 (31)	6	45	32	13.1

Figure 7.1: Hip Replacement: Pre-and Post-operative Oxford Hip Scores All Hospitals (with 95% confidence interval)



7.1.6 EQ-5D

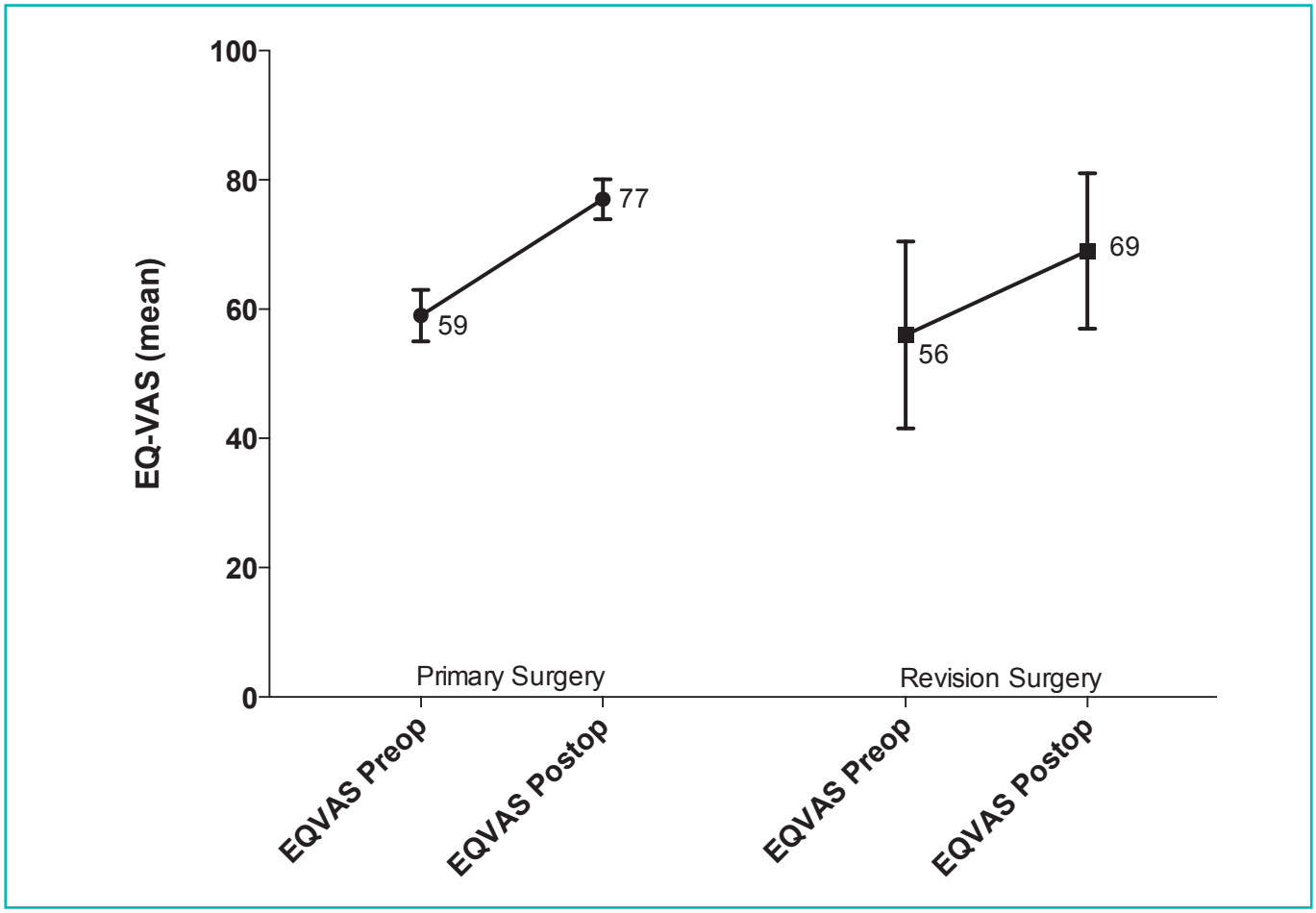
Table 7.11: Primary Hip Replacement: Pre- and post-operative EQ-5D

Primary Hips	Preoperative Responses		Postoperative Responses	
	% No problems	% Some problems	% No problems	% Some problems
Mobility	2.2	97.8	45.7	54.3
Personal Care	17.0	83.0	63.6	36.4
Usual Activities	3	97.3	51.2	48.8
Pain or Discomfort	1	99.5	38.5	61.5
Anxiety or Depression	28.9	71.1	74.7	25.3

Table 7.12: Revision Hip Replacement: Pre- and post-operative EQ-5D

Primary Hips	Preoperative Responses		Postoperative Responses	
	% No problems	% Some problems	% No problems	% Some problems
Mobility	0	100	18	82
Personal Care	20	80	59	41
Usual Activities	7	93	35	65
Pain or Discomfort	7	93	35	65
Anxiety or Depression	33	67	65	35

Figure 7.2: Hip Replacement: Pre- and Post-operative EQ VAS All Hospitals (with 95% confidence interval)



7.2 Knee Replacement

7.2.1 Expectations of Recovery

Table 7.13: Primary Knee Replacement: Expectation of Pain at 6-months by Gender

Primary Knees	Expectation of Pain at 6-months (N = 84)			
	No pain N (%)	Slight pain N (%)	Moderate pain N (%)	Severe pain N (%)
Male	10 (35)	18 (62)	1 (4)	0 (0)
Female	25 (46)	28 (51)	2 (4)	0 (0)
TOTAL	**35 (42)**	**46 (55)**	**3 (4)**	**0 (0)**

Table 7.14: Primary Knee Replacement: Expectation of Functional Ability at 6-months by Gender

Primary Knees	Expectation of Functional Ability at 6-months (N = 84)			
	No limitation N (%)	Slight limitation N (%)	Moderate limitation N (%)	Severe limitation N (%)
Male	11 (38)	18 (62)	0 (0)	0 (0)
Female	18 (33)	36 (66)	1 (2)	0 (0)
TOTAL	**29 (35)**	**54 (64)**	**1 (1)**	**0 (0)**

7.2.2 Satisfaction and Success

Table 7.15: Primary Knee Replacement: Satisfaction at 6-months by Gender

Primary Knees	Satisfaction (N = 381)				
	Excellent N (%)	Very Good N (%)	Good N (%)	Fair N (%)	Poor N (%)
Male	59 (43.7)	37 (27.4)	21 (15.6)	11 (8.2)	7 (5.2)
Female	102 (41.5)	83 (33.7)	33 (13.4)	15 (6.1)	13 (5.3)
TOTAL	**161 (42.3)**	**120 (31.5)**	**54 (14.2)**	**26 (6.8)**	**20 (5.2)**

Table 7.16: Primary Knee Replacement: Success at 6-months by Gender

Primary Knees	Success (N = 382)				
	Much better N (%)	A little better N (%)	About the same N (%)	A little worse N (%)	Much worse N (%)
Male	101 (74.8)	17 (12.6)	8 (5.9)	2 (1.5)	7 (5.2)
Female	197 (79.8)	31 (12.6)	7 (2.8)	6 (2.4)	6 (2.4)
TOTAL	**298 (78.0)**	**48 (12.6)**	**15 (3.9)**	**8 (2.1)**	**13 (3.4)**

Table 7.17: Revision Knee Replacement: Satisfaction at 6-months by Gender

	Satisfaction (N = 15)				
	Excel-lent N (%)	Very Good N (%)	Good N (%)	Fair N (%)	Poor N (%)
Male	1 (14)	1 (14)	4 (57)	0 (0)	1 (14)
Female	4 (50)	1 (13)	1 (13)	2 (25)	0 (0)
TOTAL	**5 (33)**	**2 (13)**	**5 (33)**	**2 (13)**	**1 (7)**

Table 7.18: Revision Knee Replacement: Success at 6-months by Gender

	Success (N = 15)				
	Much better N (%)	A little better N (%)	About the same N (%)	A little worse N (%)	Much worse N (%)
Male	2 (29)	3 (43)	0 (0)	1 (14)	1 (14)
Female	6 (75)	1 (13)	1 (13)	0 (0)	0 (0)
TOTAL	**8 (53)**	**4 (27)**	**1 (7)**	**1 (7)**	**1 (7)**

7.2.3 Reported Recovery

Table 7.19: Person Reported Recovery at 6-months by Type

All Knees	Reported Recovery	
	Readmission N (%)	Reoperation N (%)
Primary Knees (N = 385)	34 (9)	12 (3)
Revision Knees (N = 15)	2 (13)	0 (0)

7.2.4 Complications Reported Since Discharge Not Requiring Readmission or Reoperation

Table 7.20: Knee Replacement: Any Complication Reported Since Discharge

All Knees	Any Complication* Reported Since Discharge	
	Yes N (%)	No N (%)
Primary Knees (N = 384)	71 (18.5)	313 (81.5)
Revision Knees (N = 15)	3 (20)	12 (80)

**Type of complication reported includes unexpected pain at 6-months (N = 27), prescribed oral or IV antibiotics since discharge (N = 29), ongoing joint stiffness (N = 12), and N < 5 reported the following problems: a cardiovascular event; VTE (either DVT or PE); ongoing paraesthesia/anaesthesia; muscle weakness causing functional impairment; neuropathy; a leg length discrepancy; or cellulitis. A person may report more than one complication.*

7.2.5 Oxford Knee Scores

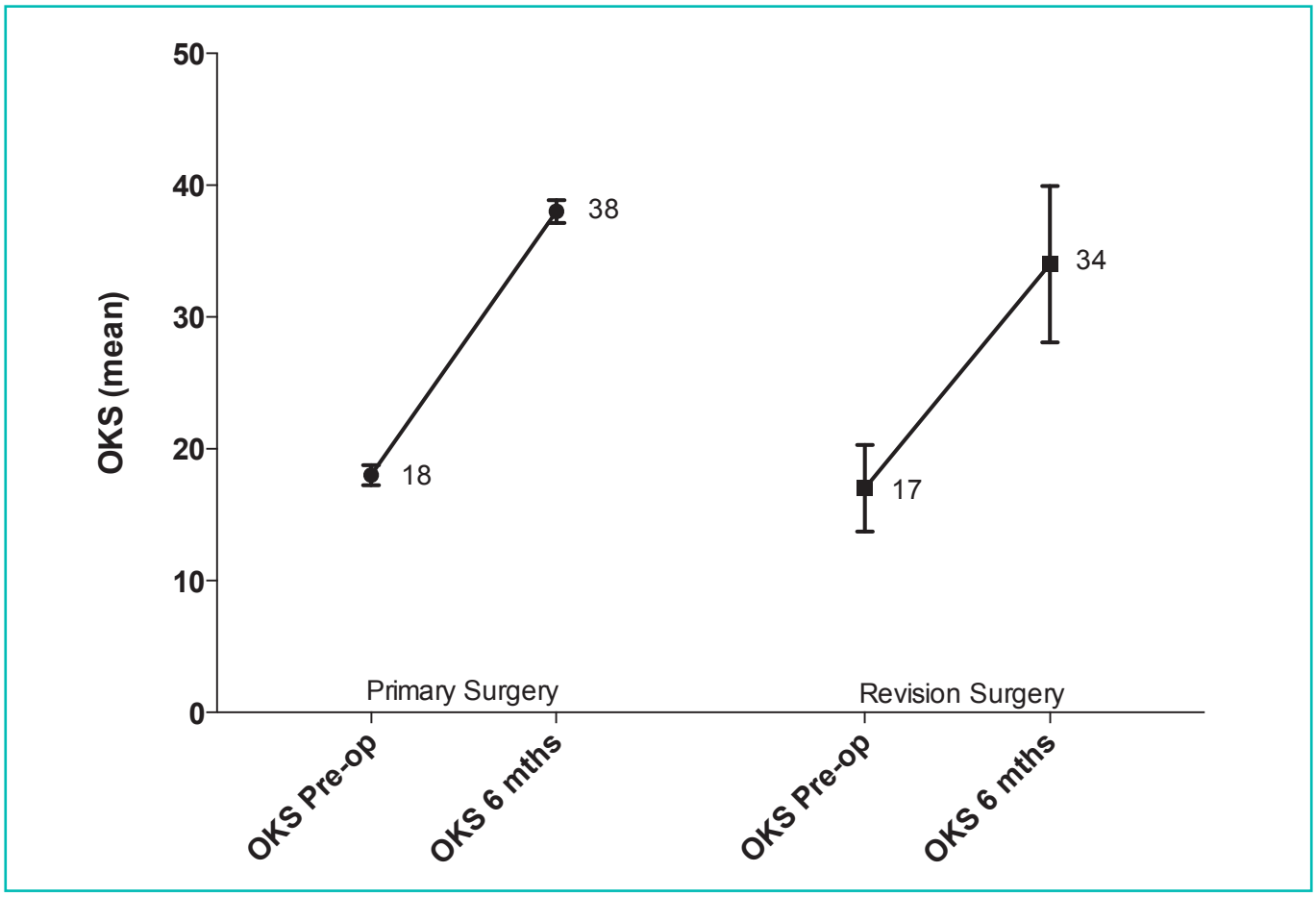
Table 7.21: Primary Knee Replacement: Oxford Knee Score Responses

Primary Knees	OHS Responses Primary Surgery							
	Poor (<27) N (%)	Fair (27-33) N (%)	Good (34-41) N (%)	Excellent (>41) N (%)	Min	Max	Mean	SD
Preoperative Responses (N = 447)	386 (86.4)	49 (11.0)	9 (2.0)	3 (0.7)	3	47	18	8.1
Postoperative Responses (N = 376)	40 (10.6)	44 (11.7)	130 (34.6)	162 (43.1)	7	48	38	8.5

Table 7.22: Revision Knee Replacement: Oxford Knee Score Responses

Revision Knees	OKS Responses Revision Surgery							
	Poor (<27) N (%)	Fair (27-33) N (%)	Good (34-41) N (%)	Excellent (>41) N (%)	Min	Max	Mean	SD
Preoperative Responses (N = 20)	19 (95)	1 (5)	0 (0)	0 (0)	3	29	17	7.0
Postoperative Responses (N = 14)	3 (21)	3 (21)	5 (36)	3 (21)	9	48	34	10.3

Figure 7.3: Knee Replacement: Pre-and Post-operative Oxford Knee Scores All Hospitals (with 95% confidence interval)



7.2.6 EQ-5D

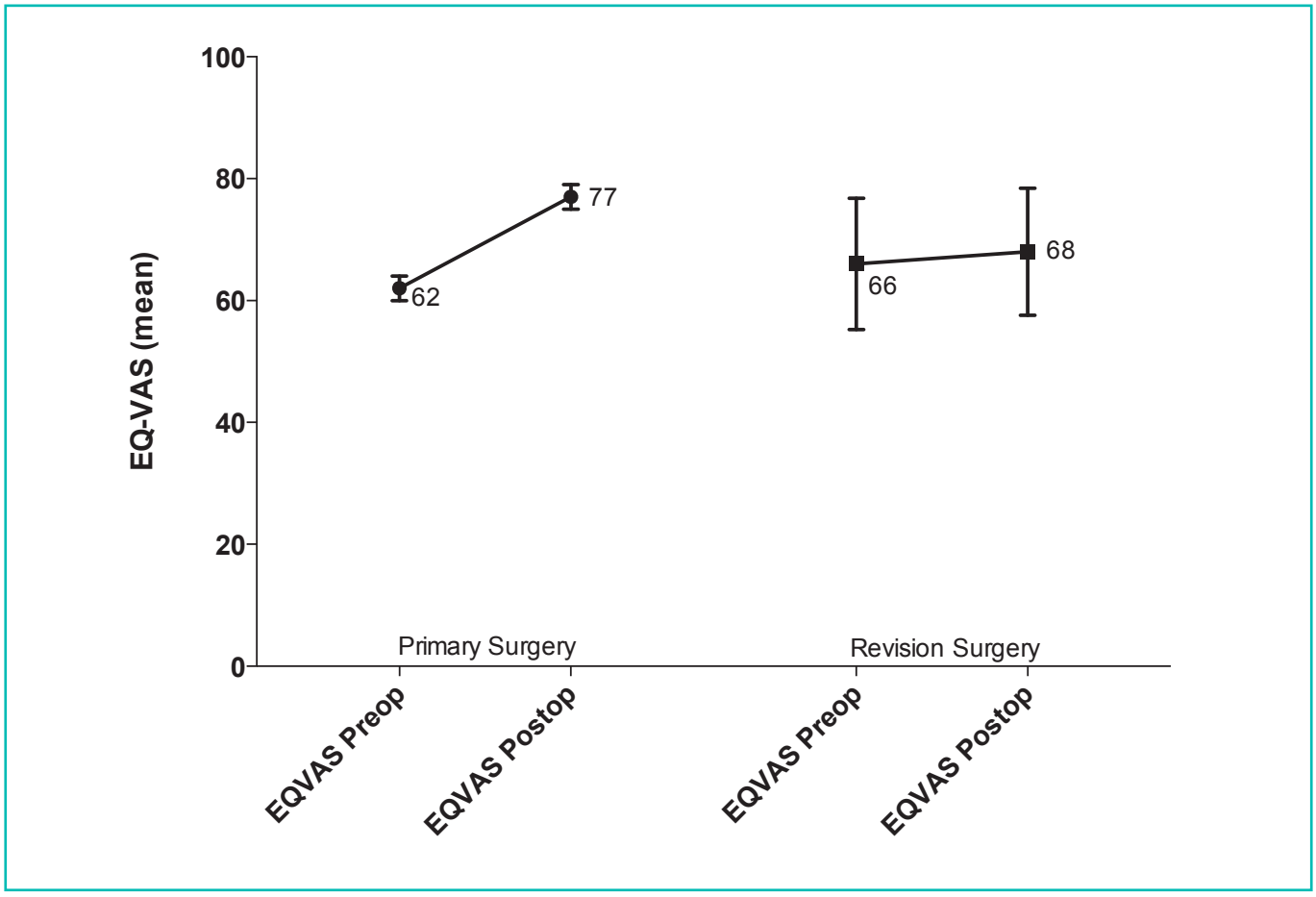
Table 7.23: Primary Knee Replacement: Pre and post-operative EQ-5D

Primary Knees	Preoperative Responses		Postoperative Responses	
	% No problems	% Some problems	No problems	Some problems
Mobility	3.7	96.3	47.9	52.1
Personal Care	34.3	65.7	78.5	21.5
Usual Activities	6.9	93.1	50.7	49.3
Pain or Discomfort	0.9	99.1	37.8	62.2
Anxiety or Depression	34.1	65.9	74.0	26.0

Table 7.24: Revision Knee Replacement: Pre and post-operative EQ-5D

Revision Knees	Preoperative Responses		Postoperative Responses	
	% No problems	% Some problems	% No problems	% Some problems
Mobility	10	90	36	64
Personal Care	45	55	50	50
Usual Activities	10	90	14	86
Pain or Discomfort	0	100	14	86
Anxiety or Depression	30	70	57	43

Figure 7.4: Knee Replacement: Pre- and Post-operative EQ VAS All Hospitals (with 95% confidence interval)



Appendices

Appendix 1: ACORN Steering Committee Terms of Reference 2014

Role

The role of the Steering Committee is to promote participation in the registry and to provide oversight and direction to the initiation, implementation and ongoing development of the Arthroplasty Clinical Outcomes Registry NSW (ACORN).

Philosophy

Joint replacement surgery is a cost-effective intervention for people experiencing pain and poor function as a consequence of end-stage joint disease from a variety of conditions. The Steering Committee for the Arthroplasty Clinical Outcomes Registry will develop and maintain a registry that improves the outcomes of joint replacement surgery by monitoring, evaluating and reporting on outcomes after surgery.

Purpose

- Identify characteristics that place people at risk of poor outcome after joint replacement surgery and develop predictors of outcome after surgery.
- Monitor rates of key complications requiring readmission, reoperation, and/or intervention and identify variation of outcomes.
- Provide feedback to participating orthopaedic departments and individual surgeons of the clinical outcomes of joint replacement surgery.
- Provide information on the effect of joint replacement surgery on health outcomes that patients may use to inform their decisions about joint replacement surgery.

Functions

- Advise and agree on the scope, development and implementation of the Arthroplasty Clinical Outcomes Registry.
- Advise and agree on strategies for sustainability of the registry.
- Provide oversight of the activities of the registry and its management committee.
- Continually review the objectives of the registry and assess the registry's ability to continue to meet these objectives.
- Develop a risk management plan and continually monitor and review risks to the sustainability of the registry.
- Develop a communication strategy with the management team that is appropriate to each stakeholder.
- Provide strategy and oversight for the development of policies to address clinical issues identified by the registry, including outliers and adverse clinical outcomes.
- Use the data collected to inform clinical practice at participating sites and more generally across the health system.
- Monitor and advise on the registry's data collection processes, management of data quality and the analysis and reporting of data to ensure consistency, completeness and standardisation of data processes.
- Oversee the establishment of policies for review of access to, and use of, registry data, and oversee all requests for research using the registry data.
- Review all publications arising from the use of the registry data.

Membership

Steering Committee membership will consist of:

- Clinical/Academic Orthopaedic Surgeon
- Clinical Researcher Orthopaedics
- ≥4 Orthopaedic Surgeon representatives who are clinically active in lower limb arthroplasty
- Nurse Representative
- Registry Representative
- Others as agreed by the Steering Committee

The Committee will have no fewer than 5 members. The appointment of a new member, or replacement of a departing member, will require the agreement of a 2/3 majority of the committee members. Membership will be reviewed annually with the Terms of Reference.

Meetings

The Steering Committee will meet at regular intervals, at least quarterly, and arrange extraordinary meetings if required. At other times communication will be by email, teleconference or web conference as needed. Minutes of the previous meeting are to be confirmed at the next ordinary meeting and no business is to be transacted until the previous meetings minutes have been confirmed or otherwise addressed.

Quorum

≥ 50% of members

Secretariat

A member of the Registry Management Committee will provide secretariat functions and the Chair of the committee will ensure minutes are kept of all meetings.

Declarations of Conflict of Interest

All members are asked to declare any perceived, potential or actual conflict of interest at the commencement of their term on the committee, or during the course of their membership term if necessary.

Review of the Terms of Reference

12 monthly. Review of the Arthroplasty Clinical Outcomes Registry NSW (ACORN) Terms of Reference will be January 2015.

Appendix 2: Australian Classification of Health Interventions (ACHI) codes

Table 3: Codes eligible for inclusion in ACORN

Block 1489	**Arthroplasty of hip**
49312-00	Excision arthroplasty of hip
49318-00	Total arthroplasty of hip, unilateral
49319-00	Total arthroplasty of hip, bilateral
Block 1492	**Revision arthroplasty of hip**
49324-00	Revision of total arthroplasty of hip
49327-00	Revision of total arthroplasty of hip with bone graft to acetabulum
49330-00	Revision of total arthroplasty of hip with bone graft to femur
49333-00	Revision of total arthroplasty of hip 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 of hip with anatomic specific allograft to acetabulum and femur
Block 1518	**Arthroplasty of knee**
49517-00	Hemi-arthroplasty of knee
49518-00	Total arthroplasty of knee, unilateral
49519-00	Total arthroplasty of knee, bilateral
49534-01	Total replacement arthroplasty of patellofemoral joint of knee

Block 1519	**Arthroplasty of knee with bone graft to femur or tibia**
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
Block 1523	**Revision of total arthroplasty of knee with bone graft to femur or tibia**
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
Block 1524	**Other revision procedures on knee**
49527-00	Revision of total arthroplasty of knee
90562-00	Patella resurfacing

Table 4: Codes excluded from ACORN

Block 1489	Arthroplasty of hip
47522-00	Hemi-arthroplasty of femur
49315-00	Partial arthroplasty of hip
90607-00	Resurfacing of hip, unilateral
90607-01	Resurfacing of hip, bilateral
Block 1492	**Revision arthroplasty of hip**
49346-00	Revision of partial arthroplasty of hip

Block 1501	Other incision procedures on knee
49515-00	Removal of knee prosthesis
Block 1518	**Arthroplasty of knee**
49534-01	Total replacement arthroplasty of patellofemoral joint of knee
Block 1524	**Other revision procedures on knee**
49545-00	Revision arthrodesis of knee

Appendix 3: List of Abbreviations

ACORN	Arthroplasty Clinical Outcomes Registry
BMI	Body Mass Index
DDH	Developmental Dysplasia Hip
DVT	Deep Venous Thrombosis
HNE HREC	Hunter New England Human Research Ethics Committee
NESB	Non-English Speaking Background
NJRR	National Joint Replacement Registry
OA	Osteoarthritis
OHS	Oxford Hip Score
OKS	Oxford Knee Score
PE	Pulmonary Embolism
PROMs	Patient-Reported Outcome Measures
RA	Rheumatoid Arthritis
TJR	Total Joint Replacement

References

1. *Australian Orthopaedic Association National Joint Replacement Registry Annual Report* (2013), Adelaide: AOA.

2. Naylor Justine M, H. A. R., Heard Robert C, Harris Ian A (2009). "Patterns of recovery following knee and hip replacement in an Australian cohort." *Australian Health Review*, Vol. 33, p. 124–135.

3. Browne, J. et al (2007), *Patient Reported Outcome Measures (PROMs) in Elective Surgery: Report to the Department of Health, Health Services Research Unit London School of Hygiene & Tropical Medicine & Clinical Effectiveness Unit Royal College of Surgeons of England*, accessed 12 February 2014, available at http://www.lshtm.ac.uk/php/hsrp/research/proms_report_12_dec_07.pdf

4. Dawson, J., Fitzpatrick, R., Carr, A. and Murray, D. (1996), Questionnaire on the perceptions of patients about total hip replacement. *Journal of Bone and Joint Surgery* (Br), Vol. 78(2), p. 185-190.

5. Dawson, J., Fitzpatrick, R., Murray, D. and Carr, A. (1998), Questionnaire on the perceptions of patients about total knee replacement. *Journal of Bone and Joint Surgery* (Br), Vol. 80(1), p. 63-69.

6. Kalairajah, Y., Azurza, K., Hulme, C., Molloy, S. et al (2005), Health outcome measures in the evaluation of total hip arthroplasties - a comparison between the Harris hip score and the Oxford hip score. *Journal of Arthroplasty,* Vol. 20(8), p. 1037-1041.

7. New Zealand Orthopaedic Association (2013), *The New Zealand Joint Registry Fourteen Year Report,* accessed 14 January 2014, available at http://www.nzoa.org.nz/nz-joint-registry