Demographics and Outcomes of Shoulder Arthroplasty

SUPPLEMENTARY REPORT
2012

AUSTRALIAN ORTHOPAEDIC ASSOCIATION

National Joint Replacement Registry

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INTRODUCTION

This is the fifth Shoulder Arthroplasty Annual Report of the Australian Orthopaedic Association National Joint Replacement Registry (AOA NJRR). The analysis is based on 14,164 shoulder procedures reported to the Registry with a procedure date up to and including 31 December 2011.

The Registry receives information from all hospitals (public and private) undertaking joint replacement. Currently this involves 299 Hospitals but varies from time to time due to hospital closures, new hospitals opening, or hospitals changing services.

Data collection on shoulder replacement commenced in November 2007, however the Registry had approval to collect shoulder arthroplasty procedures from a number of hospitals prior to the national start date. These data have also been included and therefore the data period for this report is 16 April 2004 to 31 December 2011.

Data Collection

Hospitals provide data on specific Registry forms, which are completed in theatre at the time of surgery and submitted to the Registry monthly. Examples of Registry data forms are available on the website www.dmac.adelaide.edu.au/aoanjrr/documentation.jsp.

The Registry uses a paper-based system, however it has established mechanisms to collect data electronically when it becomes feasible for contributing hospitals. To date no hospital is providing data electronically.

Data Validation

The Registry validates data collected from both public and private hospitals by comparing it to data provided by state and territory health departments. Validation of Registry data is a sequential multi-level matching process against health department unit record data.

The validation process identifies:

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

Initial validation is performed using hospital and patient identity number with subsequent verification undertaken on relevant procedure codes and appropriate admission periods.

Data errors can occur within Government or Registry data at any of these levels; that is, errors in patient identification, coding or admission period attribution by either the hospital, state/territory health department or the Registry. Data mis-matches are managed depending on the nature of the error. For example a health department record for a primary 'knee' may match a Registry held record for a 'hip' on all parameters except procedure type. The Registry would regard the Registry data to be correct in this instance as the Registry record contains details of the prostheses implanted. Other errors may be resolved by contacting hospitals for clarification of primary or revision codes or admission period.

In the 2010/11 financial year, the Registry received almost 1,200 more procedures than were provided in the various health department data files. The Registry accepts that these additional notifications are valid.

The validation process identifies procedures not submitted to the Registry, most of the unreported procedures have been undertaken for trauma. Sufficient information is provided in the state unit record data to enable the Registry to obtain procedure details from individual hospitals for these data.

Initial validation resulted in over 93.9% of Registry records verified against health department data. Following the retrieval of unreported records and checking of unmatched data, the Registry is able to obtain an almost complete dataset relating to joint replacement in Australia.

Outcome Assessment

The Registry describes the time to first revision using the Kaplan-Meier estimates of survivorship. The cumulative percent revision at a certain time, for example five years, is the complement (in probability) of the Kaplan-Meier survivorship function at that time, multiplied by 100. The cumulative percent revision accounts for right censoring due to death and 'closure' of the database at the time of analysis.

Confidence intervals for the cumulative percent revision are unadjusted point-wise Greenwood estimates and should not be used to infer significant differences in revision between groups. Reported hazard ratios should be used when judging statistical significance.

Hazard ratios (HR) from Cox proportional hazards models, adjusting for age and sex where appropriate, are used to compare revision rates. For each model

the assumption of proportional hazards is checked analytically. If the interaction between the predictor and the log of time is statistically significant in the standard Cox model, then a time varying model is estimated. Time points are iteratively chosen until the assumption of proportionality is met, then the hazard ratios are calculated for each selected time period. If no time period is specified then the hazard ratio is over the entire follow-up period. All tests are two-tailed at the 5% level of significance.

The cumulative percent revision is displayed graphically until the number at risk for the group reaches 40, unless the initial number for the group is less than 100, in which case the graph is extended until 10% of the initial number at risk remains. This avoids uninformative, imprecise estimates at the right tail of the distribution where the number at risk is low. However, analytical comparisons of revision rates using the proportional hazards model are based on all available data (*Pocock SJ, Clayton TC, Altman DG. Survival plots of time to event outcomes in clinical trials: good practice and pitfalls, Lancet 2002; 359: 1686-89*).

In the presence of a competing risk for revision, the Kaplan-Meier method is known to overestimate the true probability of revision. Death of the patient before revision presents such a competing risk. In circumstances where the risk of death is high (for example, in elderly patients having arthroplasty procedures following trauma) the bias in the Kaplan-Meier estimates may be substantial and the reported cumulative percent revision should be interpreted with caution.

The Registry is currently investigating the introduction of different analytic methods to cope with competing risks. Cumulative incidence is one method of estimating the probability of revision in the presence of competing risks. In the 2010 Annual Report, the Registry introduced revision diagnosis cumulative incidence graphs to deal with the competing risks of reasons for revision. Revision diagnosis cumulative incidence graphs are useful when making comparisons between groups as the differences in the pattern of revision over time is highlighted and provides important insight into different mechanisms of failure.

More detailed information on the statistical methods used in this report is presented in Appendix 2 in the 2012 Annual Report.

An important Registry focus has been the continued development of a standardised algorithm to identify prostheses or combination of prostheses not performing to the level of others in its class. The Registry refers to this group as 'prostheses with a higher than anticipated rate of revision'. A three-stage approach has been developed and is outlined in detail in the relevant section.

Report Review Prior to Publication

This year a review process was undertaken in which members of the Shoulder and Elbow Society were invited to attend a teleconference to review, comment and provide advice and feedback on the report with full access to the data provided using a web browser. The review was held on 5 September 2012 and was attended by eight orthopaedic surgeons, NJRR Committee Chairman, Registry Director and Deputy Director as well as Registry and DMAC staff. All sections of the report related to the analysis of Registry data were reviewed.

Acknowledgements

The Registry continues to receive support and invaluable assistance from the Commonwealth Government, State and Territory Health Departments and Orthopaedic Companies. The Registry could not function without the cooperation of a large number of organisations and individuals.

The Registry acknowledges the cooperation and support provided by those undertaking the surgery and completing the data forms, in particular all orthopaedic surgeons, registrars and nursing staff.

The Registry would also like to acknowledge the ongoing support of all hospitals both public and private that undertake arthroplasty surgery nationally. The support provided by each hospital through their nominated coordinator(s) is appreciated.

SHOULDER REPLACEMENT

Categories of Shoulder Replacement

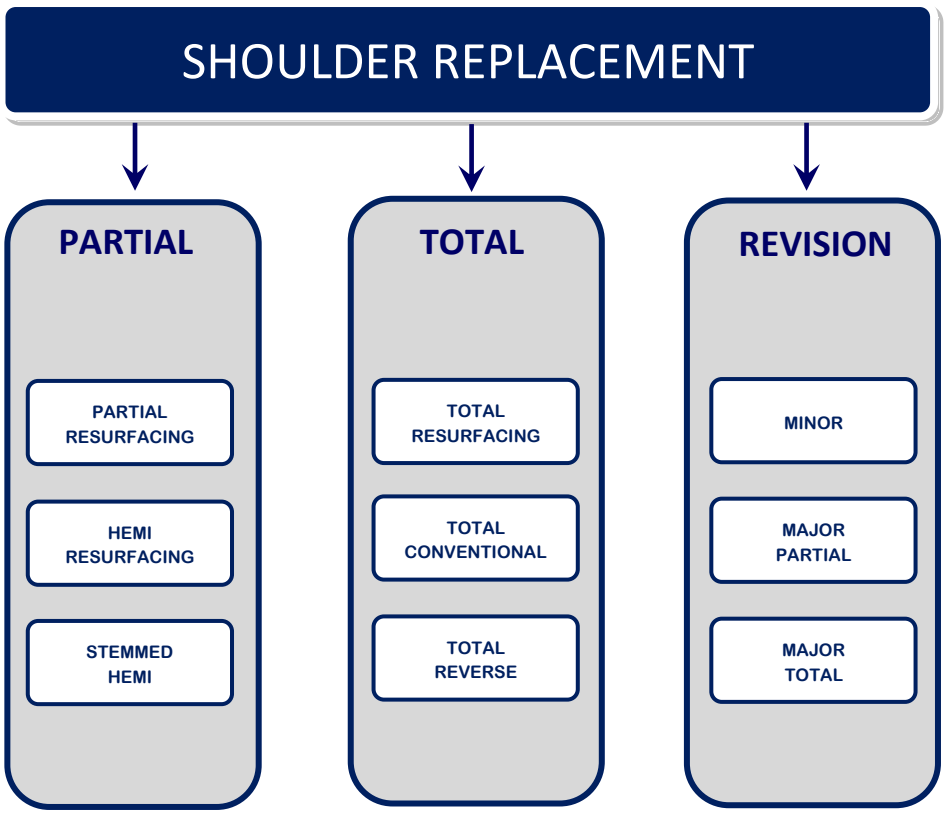
The Registry groups shoulder replacement into three broad categories, primary partial, primary total and revision shoulder replacement.

A primary replacement is the initial replacement procedure undertaken on a joint and involves replacing either part (partial) or all (total) of the articular surface.

Primary partial and primary total shoulder replacement are further sub-categorised into classes depending on the type of prostheses used. Partial shoulder classes are partial resurfacing, hemi resurfacing, partial mid head and stemmed hemi shoulder replacement. Total shoulder classes are total resurfacing, total mid head, total conventional and total reverse shoulder replacement. Definitions for each of these are detailed in the relevant chapters.

Revision procedures are re-operations of previous shoulder replacements where one or more of the prosthetic components are replaced, removed, or another component is added. Revisions include re-operations of primary partial, primary total or previous revision procedures.

Shoulder revisions are sub-categorised into three classes, minor, major partial and major total revisions. These are defined in the section on revision procedures.



REPORT OVERVIEW

Introduction

This overview summarises the major findings of shoulder arthroplasty in 2011. Analysis was undertaken on 14,164 shoulder replacement procedures reported to the Registry with a procedure date up to and including 31 December 2011. This is an additional 3,770 shoulder procedures compared to the number reported last year. The first year that the Registry collected full national data on shoulder replacement was in 2008. The number of procedures reported in 2011 is 37.1% higher than the number reported in 2008.

Shoulder replacement is more common in females (64.1%) with the majority undertaken between the ages of 65 and 84 years with a median age of 74 years for females and 69 years for males (Tables S1, S2 and S4).

Most procedures are undertaken in private hospitals (68.5%) and this proportion has remained constant since the Registry began data collection.

Total shoulder replacement is the most common type of replacement and accounted for 70.8% of all shoulder procedures in 2011, which is an increase compared to the proportion reported in 2008 (57.6%). Partial shoulder replacement has decreased from 32.7% to 19.7% during the same period. The proportion of revision shoulder procedures has not changed (9.5% in 2011) (Figure S1).

Primary Partial Shoulder Replacement

There has been an analysis of 3,627 partial shoulder procedures. Most are female (67.4%) and the median age is 74 years for females and 64 years for males. Fracture/dislocation is the principal diagnosis (46.6%) followed by osteoarthritis (41.9%) (Tables SP1 and SP2 and Figure SP1).

The Registry reports on three main classes of partial shoulder replacement; partial resurfacing, hemi resurfacing and stemmed hemi arthroplasty. Stemmed hemi arthroplasty is the most common partial shoulder replacement (73.9%) followed by hemi resurfacing (23.7%) and partial resurfacing (2.4%) (Table S1).

Only a small number of partial resurfacing procedures have been reported to the Registry (86) and none have been revised. There is no significant difference in the revision rates of primary stemmed hemi arthroplasty and hemi resurfacing with a cumulative percent revision at four years of 7.7% and 10.0% respectively (Tables SP3 and SP4 and Figure SP2).

Primary Partial Resurfacing

Primary partial resurfacing is undertaken more commonly in males (76.7%). The median age for females is 74 years compared to 41 years for males (Table SP5). The principal diagnosis is osteoarthritis (52.3%) followed by fracture/dislocation (30.2%) (Table SP6).

Primary Hemi Resurfacing

Males accounted for 52.4% of all primary hemi resurfacing procedures. The median age for females is 70 years and for males is 63 years (Table SP7). This procedure is most commonly undertaken for osteoarthritis (85.9%) (Table SP8).

The most common prostheses used in 2011 are the Copeland followed by the PyroTITAN and the SMR (Table SP9)

Outcome does not vary by age or gender (Tables SP10–SP13 and Figures SP5 and SP6). The outcomes of the most commonly used prostheses are listed in Tables SP14 and SP15.

Primary Stemmed Hemi Arthroplasty

Primary stemmed hemi arthroplasty is most commonly undertaken in females (75.1%) with a median age of 75 years. The median age for males is 67 years (Table SP16). Fracture/dislocation is the principal diagnosis (61.2%) followed by osteoarthritis (27.5%) (Table SP17).

The most common prostheses used in 2011 are the SMR followed by the Aequalis and the Global FX (Table SP18)

Outcome does not vary by diagnosis (Tables SP19 and SP20 and Figure SP8). The outcomes of the most commonly used prostheses for all diagnoses are listed in Tables SP21 and SP22.

Analysis of the outcome of patients receiving stemmed hemi shoulder replacements for osteoarthritis does not vary by age or gender (Tables SP23-SP26 and Figures SP9 and SP10). The outcomes of the most commonly used prostheses for osteoarthritis are listed in tables SP27 and SP28.

Analysis of the outcome of patients receiving stemmed hemi shoulder replacements for fracture/dislocation varies by age. Patients aged 75 years and older have a significantly lower rate of revision compared to patients aged less than 65 years and 65 -74 years (Tables SP29 and SP30 and Figure SP11). There is no variation in outcome by gender

(Tables SP31 and SP32 and Figure SP12). The outcomes of the most commonly used prostheses for fracture/dislocation are listed in tables SP33 and SP34.

Primary Total Shoulder Replacement

There has been an analysis of 9,150 total shoulder procedures. Most are female (63.5%) and the median age is 74 years for females and 70 years for males. The principal diagnosis is osteoarthritis (74.1%) followed by rotator cuff arthropathy (13.8%) and fracture/dislocation (6.8%). Rheumatoid arthritis and osteonecrosis account for 2.8% and 1.3% respectively (Tables ST1 and ST2 and Figure ST1).

The Registry reports on three main classes of primary total shoulder replacement; total conventional (55.2%), total reverse (43.8%) and total resurfacing (0.9%) (Table S1).

Only a small number of total resurfacing procedures have been reported to the Registry (85), seven have been revised and the cumulative percent revision at four years of 17.4%. At five years the cumulative percent revision for total conventional and total reverse shoulder replacement is 6.2% and 6.1% respectively. Total reverse shoulder replacement has a significantly higher rate of revision in the first three months. Total conventional shoulder replacement has a higher rate of revision from three months to one year, after this period there is no difference in the rate of revision between total reverse and total conventional shoulder replacement (Tables ST3 and ST4 and Figure ST2).

Primary Total Resurfacing

Primary total resurfacing replacement is undertaken more often in males (61.2%). The median age is 67 years for females and 63 years for males (Table ST5). Osteoarthritis is the main diagnosis (91.8%) (Table ST6).

Only three prostheses were used in 2011, Global CAP SMR and Epoca RH (Table ST7 and ST8)

Primary Total Conventional

Primary total conventional shoulder replacement accounted for 35.6% of all shoulder replacements in 2011 (32.3% in 2008). This procedure is most commonly undertaken in females (60.5%). The median age for females is 72 years and for males is 67 years (Table ST9). The principal diagnosis is osteoarthritis (92.4%) (Table ST10).

The most commonly used prostheses in 2011 are the SMR followed by the Global AP and the Aequalis (Tables ST11 and ST12).

At five years the cumulative percent revision for patients with osteoarthritis is 6.0%. There is no significant difference in the rate of revision between procedures undertaken for osteoarthritis and the other primary diagnoses (Tables ST13 and ST14 and Figure ST5).

There is an increased rate of revision in patients aged less than 65 years receiving total conventional shoulder replacement for osteoarthritis compared to patients aged 65 -74 years and 75 years and older. There is no difference in the rate of revision when the two older age groups are compared (Tables ST15 an ST16 and Figure ST6). There is no gender difference in outcomes for total conventional shoulder replacement undertaken for osteoarthritis (Tables ST17 and ST18 and Figure ST7).

Cementless fixation has a significantly higher rate of revision compared to cemented and hybrid (glenoid cemented) fixation (Table ST19 and ST20 and Figure ST8).

The outcomes of the most commonly used prostheses are listed in tables ST21 and ST22.

Primary Total Reverse

Primary total reverse shoulder replacement has increased from 24.9% of all shoulder replacements in 2008 to 34.1% in 2011. It is more commonly undertaken in females (67.9%) and the median age is 77 years for females and 75 years for males (Table ST23). The three main diagnoses are osteoarthritis (50.6%), rotator cuff arthropathy (30.9%) and fracture/dislocation (13.6%) (Table ST24).

The most commonly used prostheses in 2011 are the SMR followed by the Delta Xtend and the Aequalis (Tables ST25 and ST26).

Outcome does not vary by diagnosis (Tables ST27 and ST28 and Figure ST10). There is also no difference by age for total reverse shoulder replacement undertaken for osteoarthritis (Tables ST29 and ST30 and Figure ST11). There is however a significant difference in outcome by gender in this group of procedures with males having a higher rate of revision (Tables ST31 and ST32 and Figure ST12).

The type of fixation does not affect the rate of revision for total reverse shoulder replacement undertaken for osteoarthritis. The humeral component may be cemented or cementless however the glenoid component is almost always cementless (Tables ST33 and ST34 and Figure ST12).

The outcomes of the most commonly used prostheses are listed in tables ST35 and ST36.

Demographics of Revision

Revision procedures accounted for 9.5% of all shoulder replacements in 2011 (9.7% in 2008) (Figure S1). More females have revisions (59.7%) and the median age is 72 years for females and 68 years for males (Table SR1). The most common type of revision involves replacing both the humeral and glenoid components (34.4%). Isolated revision of the humeral component accounts for 23.1% followed by revision of the glenoid component only (12.8%) and head only (12.3%) (Table SR2). The most common reasons for revision are instability/dislocation (27.1%), loosening/lysis (24.8%), infection (10.5%) and progression to rotator cuff insufficiency (10.2%) (Table SR3).

Partial Shoulder Replacement

The median age of revisions of primary hemi resurfacing procedures is 70 years for females and 64 years for males (Table SPR1). The most common type of revision involves replacing both the humeral and glenoid components (90.2%) (Table SPR2). The main reasons for revision of hemi resurfacing procedures are pain (27.5%), rotator cuff insufficiency (21.6%) and glenoid erosion (19.6%) (Table SPR3).

Revisions of primary stemmed hemi arthroplasty procedures have a median age of 71 years for females and 64 years for males (Table SPR4). Revisions usually involve replacement of both the humeral and glenoid components (60.8%). Isolated revision of the glenoid component occurs in 15.2% of revision procedures (Table SPR5). The most common reasons for revision are instability/dislocation (25.6%), rotator cuff insufficiency (17.6%) and glenoid erosion (13.6%) (Table SPR6).

Total Shoulder Replacement

The median age of revisions of primary total resurfacing procedures is 72 years for females and 58 years for males (Table STR1). The most common type of revision involves replacing only the humeral component (57.1%) (Table STR2). There are multiple reasons given for the small number of revisions of this procedure (Table STR3).

Revisions of primary total conventional shoulder replacement are more common in females (60.7%). The median age at revision is 71 years for females and 68 years for males (Table STR4). The most common type of revision is isolated revision of the humeral component which occurs in 47.2% of revision procedures (Table STR5). The main reasons for revision are instability/dislocation (37.4%), rotator cuff insufficiency (21.5%) and loosening/lysis (18.7%) (Table STR6).

Revision of total reverse shoulder replacement is more common in females (55.1%) and the median age is 77 years for females and 76 years for males (Table STR7). The most common types of revision involve replacement of both a cup (liner) and head (glenosphere) (28.6%), cup only (27.2%) and head exchange only (19.0%) (Table STR8). The main reasons for revision are instability/dislocation (44.2%), loosening/lysis (23.8%) and infection (15.0%) (Table STR9).

Demographics of Shoulder Replacement

Table S1: Number of Shoulder Replacements by Gender

	Female		Male		TOTAL	
Shoulder Replacement	**N**	**%**	**N**	**%**	**N**	**%**
Partial Resurfacing	20	23.3	66	76.7	86	2.4
Hemi Resurfacing	409	47.6	450	52.4	859	23.7
Stemmed Hemi Shoulder	2014	75.1	668	24.9	2682	73.9
Primary Partial	**2443**	**67.4**	**1184**	**32.6**	**3627**	**100.0**
Total Resurfacing	33	38.8	52	61.2	85	0.9
Total Conventional	3059	60.5	1996	39.5	5055	55.2
Total Reverse	2722	67.9	1288	32.1	4010	43.8
Primary Total	**5814**	**63.5**	**3336**	**36.5**	**9150**	**100.0**
Revision	**828**	**59.7**	**559**	**40.3**	**1387**	**100.0**
TOTAL	**9085**	**64.1**	**5079**	**35.9**	**14164**	**100.0**

Table S2: Number of Shoulder Replacements by Age

	<55		55-64		65-74		75-84		≥85		TOTAL	
Shoulder Replacement	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Partial Resurfacing	55	64.0	8	9.3	9	10.5	12	14.0	2	2.3	86	2.4
Hemi Resurfacing	160	18.6	233	27.1	260	30.3	171	19.9	35	4.1	859	23.7
Stemmed Hemi Shoulder	209	7.8	501	18.7	773	28.8	884	33.0	315	11.7	2682	73.9
Primary Partial	**424**	**11.7**	**742**	**20.5**	**1042**	**28.7**	**1067**	**29.4**	**352**	**9.7**	**3627**	**100.0**
Total Resurfacing	21	24.7	22	25.9	33	38.8	9	10.6	.	.	85	0.9
Total Conventional	270	5.3	1109	21.9	2072	41.0	1443	28.5	161	3.2	5055	55.2
Total Reverse	42	1.0	306	7.6	1282	32.0	1934	48.2	446	11.1	4010	43.8
Primary Total	**333**	**3.6**	**1437**	**15.7**	**3387**	**37.0**	**3386**	**37.0**	**607**	**6.6**	**9150**	**100.0**
Revision	**113**	**8.1**	**292**	**21.1**	**494**	**35.6**	**392**	**28.3**	**96**	**6.9**	**1387**	**100.0**
TOTAL	**870**	**6.1**	**2471**	**17.4**	**4923**	**34.8**	**4845**	**34.2**	**1055**	**7.4**	**14164**	**100.0**

Figure S1: Proportion of Shoulder Replacements

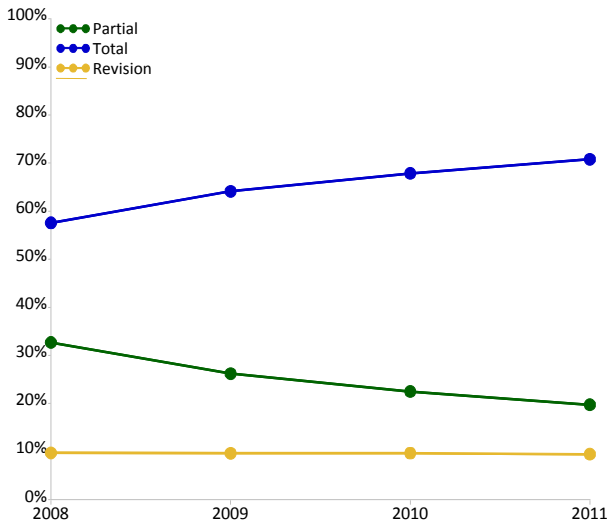


Figure S2: Trends in Usage of Shoulder Replacement by State/Territory and Year

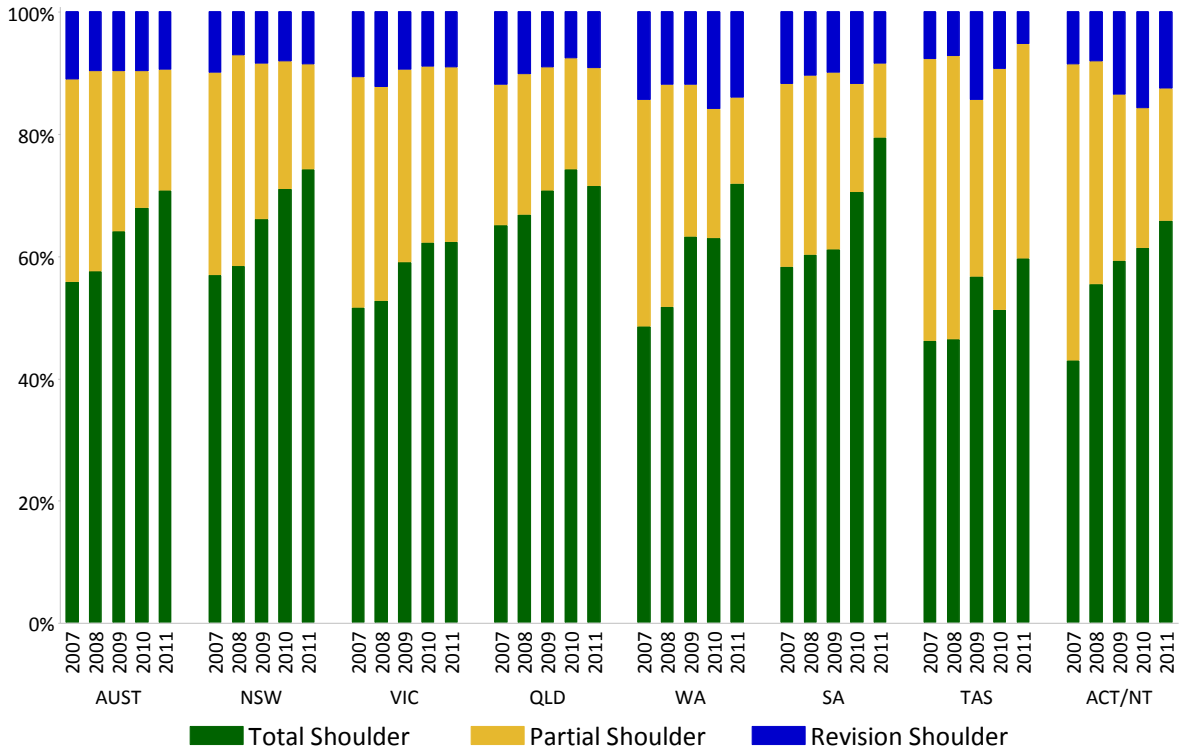


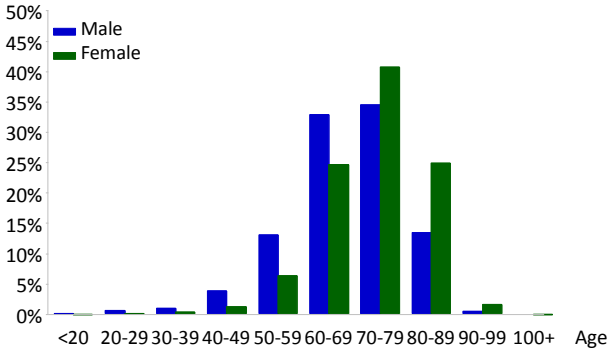
Table S3: Time between Procedures for Bilateral Primary Shoulder Replacement

	Same Day		1day-6months		≥6months		TOTAL	
Bilateral Procedures	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Both Partial	8	1.1	20	2.7	50	6.7	78	10.4
Both Total	1	0.1	114	15.2	488	65.1	603	80.4
Total/Partial	.	.	9	1.2	60	8.0	69	9.2
TOTAL	**9**	**1.2**	**143**	**19.1**	**598**	**79.7**	**750**	**100.0**

Table S4: All Shoulder Replacement by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	9085	64.1	15	101	74	73.0	9.5
Male	5079	35.9	14	96	69	68.1	11.2
TOTAL	**14164**	**100.0**	**14**	**101**	**72**	**71.2**	**10.4**

Figure S3: All Shoulder Replacement by Age and Gender



PRIMARY PARTIAL SHOULDER REPLACEMENT

Classes of Partial Shoulder Replacement

The Registry sub-categorises primary partial shoulder replacement into four classes. These are defined as:

1. **Partial resurfacing** involves the use of one or more button prosthesis to replace part of the natural articulating surface on one or both sides of the shoulder joint.
2. **Hemi resurfacing** includes the use of a humeral prosthesis that replaces the humeral articular surface only without resecting the head.
3. **Stemmed Hemi shoulder** includes the resection of the humeral head and replacement with a stemmed humeral prosthesis and humeral head prosthesis

Table SP1: Primary Partial Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2443	67.4	22	101	74	72.4	10.9
Male	1184	32.6	14	93	64	63.3	14.1
TOTAL	**3627**	**100.0**	**14**	**101**	**71**	**69.5**	**12.8**

Figure SP1: Primary Partial Shoulder by Age and Gender

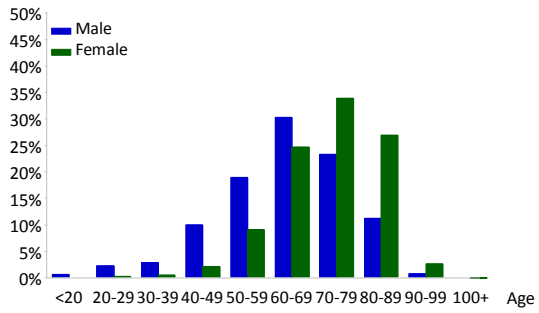


Table SP2: Primary Partial Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	1691	46.6
Osteoarthritis	1521	41.9
Rotator Cuff Arthropathy	159	4.4
Osteonecrosis	105	2.9
Rheumatoid Arthritis	73	2.0
Tumour	49	1.4
Other Inflammatory Arthritis	17	0.5
Hill-Sachs Defect	8	0.2
Osteochondritis Dissecans	2	0.1
Other	2	0.1
TOTAL	**3627**	**100.0**

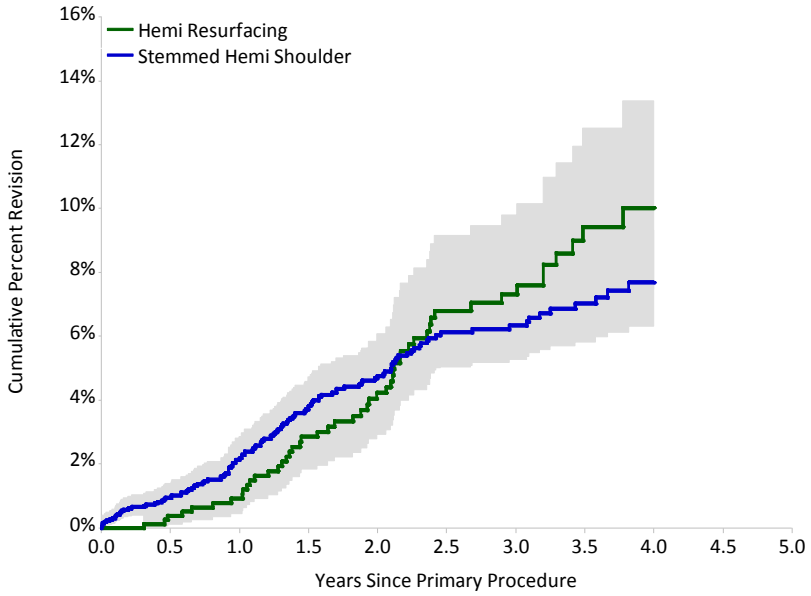
Table SP3: Revision Rates of Primary Partial Shoulder Replacement by Shoulder Class

Shoulder Class	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Partial Resurfacing	0	86	195	0.00 (0.00, 1.89)
Hemi Resurfacing	51	859	2096	2.43 (1.81, 3.20)
Stemmed Hemi Shoulder	125	2682	5756	2.17 (1.81, 2.59)
TOTAL	**176**	**3627**	**8047**	**2.19 (1.88, 2.54)**

Table SP4: Yearly Cumulative Percent Revision of Primary Partial Shoulder Replacement by Shoulder Class

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Partial Resurfacing	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
Hemi Resurfacing	0.9 (0.4, 1.9)	4.2 (2.9, 6.1)	7.3 (5.4, 9.8)	10.0 (7.5, 13.4)	
Stemmed Hemi Shoulder	2.2 (1.7, 2.9)	4.8 (3.9, 5.8)	6.3 (5.3, 7.6)	7.7 (6.3, 9.3)	
Partial	**1.8 (1.4, 2.4)**	**4.5 (3.8, 5.4)**	**6.5 (5.5, 7.6)**	**8.2 (7.0, 9.6)**	**8.2 (7.0, 9.6)**

Figure SP2: Cumulative Percent Revision of Primary Partial Shoulder Replacement by Shoulder Class



HR - adjusted for age and gender

Hemi Resurfacing vs Stemmed Hemi Shoulder

0 - 1.5Yr: HR=0.65 (0.40, 1.08),p=0.095

1.5Yr - 2.5Yr: HR=1.55 (0.89, 2.71),p=0.123

2.5Yr+: HR=2.25 (0.93, 5.43),p=0.072

Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Hemi Resurfacing	859	701	527	328	130	20
Stemmed Hemi Shoulder	2682	2008	1384	800	279	32

Primary Partial Resurfacing Shoulder Replacement

Table SP5: Primary Partial Resurfacing Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	20	23.3	32	85	74	65.6	16.6
Male	66	76.7	15	87	41	42.7	18.3
TOTAL	**86**	**100.0**	**15**	**87**	**47**	**48.0**	**20.3**

Figure SP3: Primary Partial Resurfacing Shoulder by Age and Gender

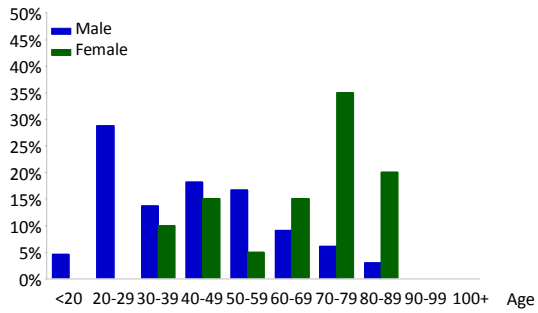


Table SP6: Primary Partial Resurfacing Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	45	52.3
Fracture/Dislocation	26	30.2
Hill-Sachs Defect	8	9.3
Osteonecrosis	3	3.5
Osteochondritis Dissecans	2	2.3
Rotator Cuff Arthropathy	2	2.3
TOTAL	**86**	**100.0**

Primary Hemi Resurfacing Shoulder Replacement

Table SP7: Primary Hemi Resurfacing Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	409	47.6	31	93	70	69.0	11.0
Male	450	52.4	19	88	63	61.9	12.3
TOTAL	**859**	**100.0**	**19**	**93**	**66**	**65.3**	**12.2**

Figure SP4: Primary Hemi Resurfacing Shoulder by Age and Gender

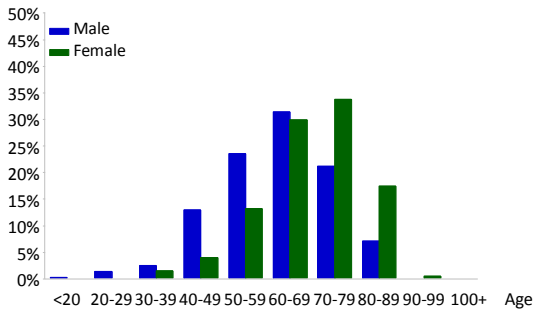


Table SP8: Primary Hemi Resurfacing Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	738	85.9
Rotator Cuff Arthropathy	54	6.3
Fracture/Dislocation	24	2.8
Osteonecrosis	20	2.3
Rheumatoid Arthritis	16	1.9
Other Inflammatory Arthritis	7	0.8
TOTAL	**859**	**100.0**

Table SP9: Most Common Humeral Head Prostheses used in Primary Hemi Resurfacing Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
68	Copeland	124	Copeland	112	Copeland	78	Copeland	51	Copeland
28	Global CAP	45	Global CAP	33	Global CAP	25	SMR	38	PyroTITAN
19	SMR	34	SMR	26	SMR	18	Aequalis	34	SMR
8	Epoca RH	11	Aequalis	19	Aequalis	12	Global CAP	12	Aequalis
		2	Epoca RH	4	Eclipse	10	PyroTITAN	12	Global CAP
		1	Buechel-Pappas	3	Epoca RH	4	Eclipse	2	Epoca RH
		1	Eclipse			1	Epoca RH		
Most Used									
123	(4) 100.0%	218	(7) 100.0%	197	(6) 100.0%	148	(7) 100.0%	149	(6) 100.0%

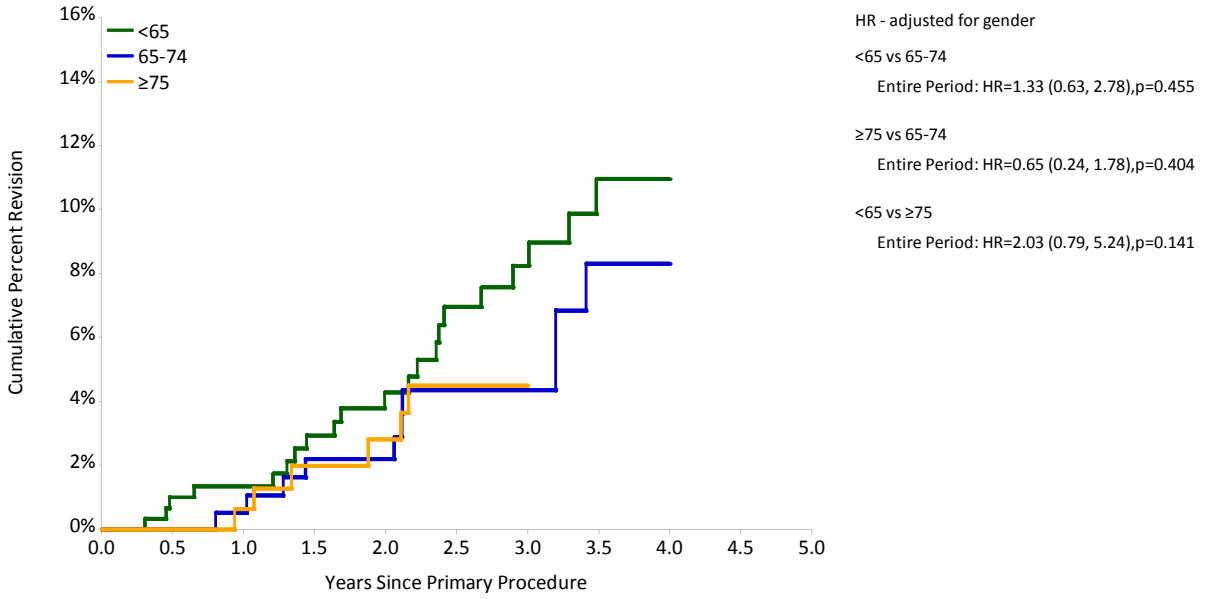
Table SP10: Revision Rates of Primary Hemi Resurfacing Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
<65	21	330	804	2.61 (1.62, 3.99)
65-74	11	230	564	1.95 (0.97, 3.49)
≥75	6	178	461	1.30 (0.48, 2.83)
TOTAL	**38**	**738**	**1828**	**2.08 (1.47, 2.85)**

Table SP11: Yearly Cumulative Percent Revision of Primary Hemi Resurfacing Replacement by Age (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	1.4 (0.5, 3.6)	4.3 (2.4, 7.6)	8.2 (5.2, 12.9)	10.9 (7.1, 16.8)	
65-74	0.5 (0.1, 3.6)	2.2 (0.8, 5.8)	4.4 (2.1, 9.0)	8.3 (4.3, 15.6)	
≥75	0.6 (0.1, 4.4)	2.8 (1.1, 7.3)	4.5 (2.0, 9.8)		

Figure SP5: Cumulative Percent Revision of Primary Hemi Resurfacing Replacement by Age (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	330	263	200	128	54	10
65-74	230	185	142	87	42	5
≥75	178	155	118	79	23	2

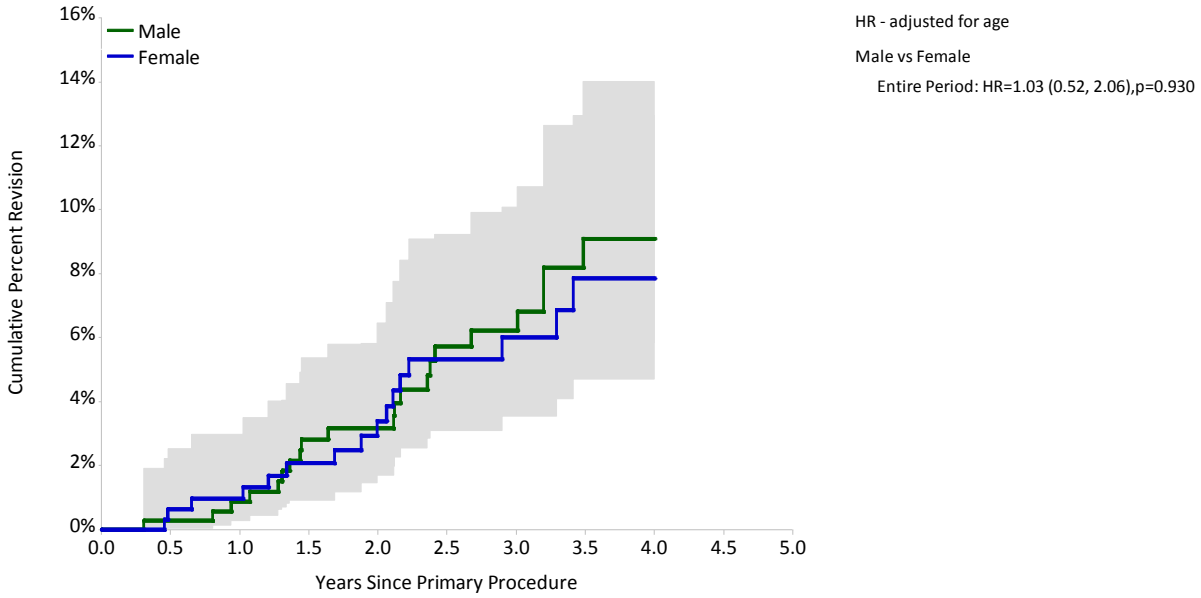
Table SP12: Revision Rates of Primary Hemi Resurfacing Replacement by Gender (Primary Diagnosis OA)

Gender	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Male	22	389	984	2.24 (1.40, 3.38)
Female	16	349	844	1.90 (1.08, 3.08)
TOTAL	**38**	**738**	**1828**	**2.08 (1.47, 2.85)**

Table SP13: Yearly Cumulative Percent Revision of Primary Hemi Resurfacing Replacement by Gender (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	0.9 (0.3, 2.7)	3.2 (1.7, 5.8)	6.2 (3.9, 9.9)	9.1 (5.8, 14.0)	
Female	1.0 (0.3, 3.0)	3.4 (1.8, 6.5)	6.0 (3.6, 10.1)	7.9 (4.7, 12.9)	

Figure SP6: Cumulative Percent Revision of Primary Hemi Resurfacing Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	389	323	250	161	65	10
Female	349	280	210	133	54	7

Table SP14: Revision Rates of Primary Hemi Resurfacing Shoulder Replacement by Humeral Head

Humeral Head	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Aequalis	3	60	114	2.64 (0.54, 7.70)
Copeland	28	436	1099	2.55 (1.69, 3.68)
Global CAP	12	145	441	2.72 (1.40, 4.75)
SMR	4	138	314	1.27 (0.35, 3.26)
Other (4)	4	80	128	3.13 (0.85, 8.02)
TOTAL	**51**	**859**	**2096**	**2.43 (1.81, 3.20)**

Note: Only Humeral Heads with over 50 procedures have been listed.

Table SP15: Yearly Cumulative Percent Revision of Primary Hemi Resurfacing Shoulder Replacement by Humeral Head

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Aequalis	0.0 (0.0, 0.0)	9.0 (3.0, 25.5)	9.0 (3.0, 25.5)		
Copeland	1.2 (0.5, 2.9)	5.2 (3.3, 8.0)	6.7 (4.4, 9.9)	9.9 (6.7, 14.5)	
Global CAP	0.7 (0.1, 5.2)	3.2 (1.2, 8.2)	9.8 (5.5, 17.1)		
SMR	0.0 (0.0, 0.0)	1.0 (0.1, 6.6)	3.6 (1.2, 10.9)		
Other (4)	2.1 (0.3, 13.9)	2.1 (0.3, 13.9)	10.2 (3.3, 29.6)	10.2 (3.3, 29.6)	

Note: Only Humeral Heads with over 50 procedures have been listed.

Primary Stemmed Hemi Shoulder Replacement

Table SP16: Primary Stemmed Hemi Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2014	75.1	22	101	75	73.2	10.7
Male	668	24.9	14	93	67	66.3	12.9
TOTAL	**2682**	**100.0**	**14**	**101**	**73**	**71.5**	**11.7**

Figure SP7: Primary Stemmed Hemi Shoulder by Age and Gender

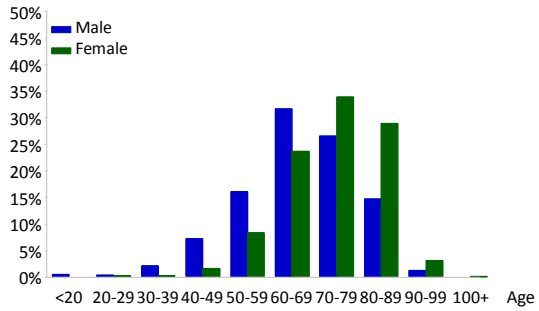


Table SP17: Primary Stemmed Hemi Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	1641	61.2
Osteoarthritis	738	27.5
Rotator Cuff Arthropathy	103	3.8
Osteonecrosis	82	3.1
Rheumatoid Arthritis	57	2.1
Tumour	49	1.8
Other Inflammatory Arthritis	10	0.4
Other	2	0.1
TOTAL	**2682**	**100.0**

Table SP18: Most Common Humeral Stem Prostheses used in Primary Stemmed Hemi Shoulder Replacement

2007		2008		2009		2010		2011	
N	Model	N	Model	N	Model	N	Model	N	Model
90	SMR	207	SMR	216	SMR	206	SMR	174	SMR
75	Global FX	138	Global FX	109	Global FX	88	Global FX	101	Aequalis
67	Global Advantage	98	Aequalis	71	Aequalis	81	Bigliani/Flatow	80	Global FX
32	Aequalis	81	Global Advantage	65	Global Advantage	80	Aequalis	61	Bigliani/Flatow
20	Bigliani/Flatow	37	Bigliani/Flatow	54	Bigliani/Flatow	38	Global AP	49	Global AP
12	Solar	13	Solar	26	Global AP	21	Global Advantage	26	Global Advantage
8	Comprehensive SS	11	Bio-Modular	10	Affinis	13	Solar	8	Comprehensive SS
4	Bio-Modular	8	Global AP	10	Delta Xtend	9	Delta Xtend	7	Solar
2	Delta Xtend	6	Univers 3D	6	Bio-Modular	6	Comprehensive SS	6	Vaios
2	Univers 3D	5	Delta Xtend	6	Solar	4	Cofield 2	5	Delta Xtend
Ten Most Used									
312 (10)	98.1%	604 (10)	98.1%	573 (10)	96.5%	546 (10)	96.6%	517 (10)	96.1%
Remainder									
6 (6)	1.9%	12 (6)	1.9%	21 (11)	3.5%	19 (9)	3.4%	21 (9)	3.9%
TOTAL									
318 (16)	100.0%	616 (16)	100.0%	594 (21)	100.0%	565 (19)	100.0%	538 (19)	100.0%

Table SP19: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Fracture/Dislocation	74	1641	3443	2.15 (1.69, 2.70)
Osteoarthritis	43	738	1712	2.51 (1.82, 3.38)
Other (6)	8	303	601	1.33 (0.57, 2.62)
TOTAL	**125**	**2682**	**5756**	**2.17 (1.81, 2.59)**

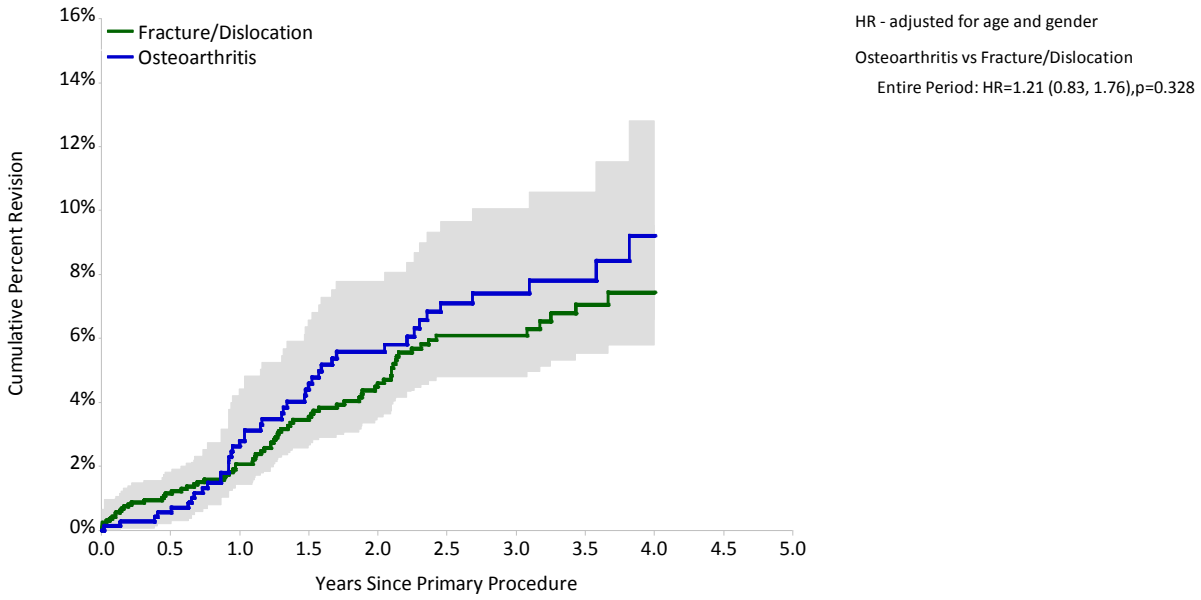
Note: Only Primary Diagnoses with over 200 procedures have been listed.

Table SP20: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Primary Diagnosis

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Fracture/Dislocation	2.1 (1.4, 3.0)	4.6 (3.6, 6.0)	6.1 (4.8, 7.7)	7.4 (5.8, 9.5)	
Osteoarthritis	2.8 (1.8, 4.4)	5.6 (4.0, 7.8)	7.4 (5.4, 10.1)	9.2 (6.6, 12.8)	
Other (6)	1.1 (0.4, 3.5)	3.2 (1.5, 6.7)	4.4 (2.1, 9.2)		

Note: Only Primary Diagnoses with over 200 procedures have been listed.

Figure SP8: Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Primary Diagnosis



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Fracture/Dislocation	1641	1217	832	468	153	14
Osteoarthritis	738	585	419	254	90	8

All Diagnoses

Table SP21: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Humeral Head and Stem

Humeral Head	Humeral Stem	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Aequalis	Aequalis	11	384	768	1.43 (0.71, 2.56)
Bigliani/Flatow	Bigliani/Flatow	5	255	491	1.02 (0.33, 2.38)
Delta Xtend	Delta Xtend	2	31	65	3.10 (0.38, 11.20)
Global AP	Global AP	3	121	160	1.87 (0.39, 5.48)
Global Advantage	Global Advantage	13	280	808	1.61 (0.86, 2.75)
Global Advantage	Global FX	28	504	1172	2.39 (1.59, 3.45)
SMR	SMR	54	898	1868	2.89 (2.17, 3.77)
Solar	Solar	4	54	130	3.09 (0.84, 7.90)
Other (28)		5	155	295	1.69 (0.55, 3.95)
TOTAL		**125**	**2682**	**5756**	**2.17 (1.81, 2.59)**

Note: Only combinations with over 30 procedures have been listed.

Table SP22: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Humeral Head and Stem

Humeral Head	Humeral Stem	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Aequalis	Aequalis	1.6 (0.6, 3.7)	4.0 (2.2, 7.1)	4.0 (2.2, 7.1)		
Bigliani/Flatow	Bigliani/Flatow	1.4 (0.4, 4.2)	2.6 (1.1, 6.1)	2.6 (1.1, 6.1)		
Delta Xtend	Delta Xtend	3.8 (0.6, 24.3)	3.8 (0.6, 24.3)	11.2 (2.7, 40.3)		
Global AP	Global AP	0.0 (0.0, 0.0)				
Global Advantage	Global Advantage	0.8 (0.2, 3.0)	2.4 (1.1, 5.3)	4.6 (2.5, 8.4)	7.0 (4.0, 12.2)	
Global Advantage	Global FX	2.2 (1.2, 4.1)	4.8 (3.1, 7.5)	7.4 (5.0, 10.7)	8.6 (5.9, 12.5)	
SMR	SMR	3.1 (2.1, 4.5)	6.2 (4.6, 8.3)	8.1 (6.2, 10.6)	10.3 (7.4, 14.1)	
Solar	Solar	4.0 (1.0, 14.9)	9.0 (3.4, 22.4)	9.0 (3.4, 22.4)	9.0 (3.4, 22.4)	
Other (28)		3.4 (1.3, 8.7)	4.3 (1.8, 10.1)	4.3 (1.8, 10.1)		

Note: Only combinations with over 30 procedures have been listed.

Osteoarthritis

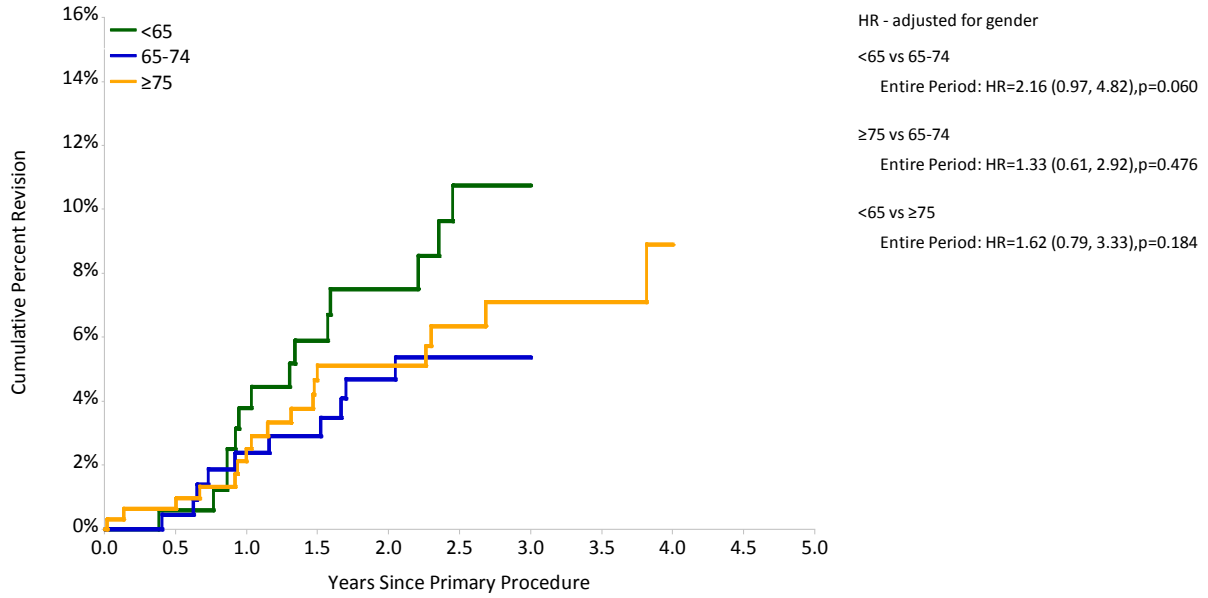
Table SP23: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
<65	16	178	420	3.81 (2.18, 6.18)
65-74	10	237	564	1.77 (0.85, 3.26)
≥75	17	323	728	2.33 (1.36, 3.74)
TOTAL	**43**	**738**	**1712**	**2.51 (1.82, 3.38)**

Table SP24: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Age (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	3.8 (1.7, 8.3)	7.5 (4.2, 13.2)	10.7 (6.4, 17.7)		
65-74	2.4 (1.0, 5.6)	4.7 (2.5, 8.8)	5.4 (2.9, 9.8)		
≥75	2.5 (1.2, 5.2)	5.1 (3.0, 8.7)	7.1 (4.3, 11.5)	8.9 (5.1, 15.2)	

Figure SP9: Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Age (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	178	147	101	60	21	3
65-74	237	193	143	89	29	1
≥75	323	245	175	105	40	4

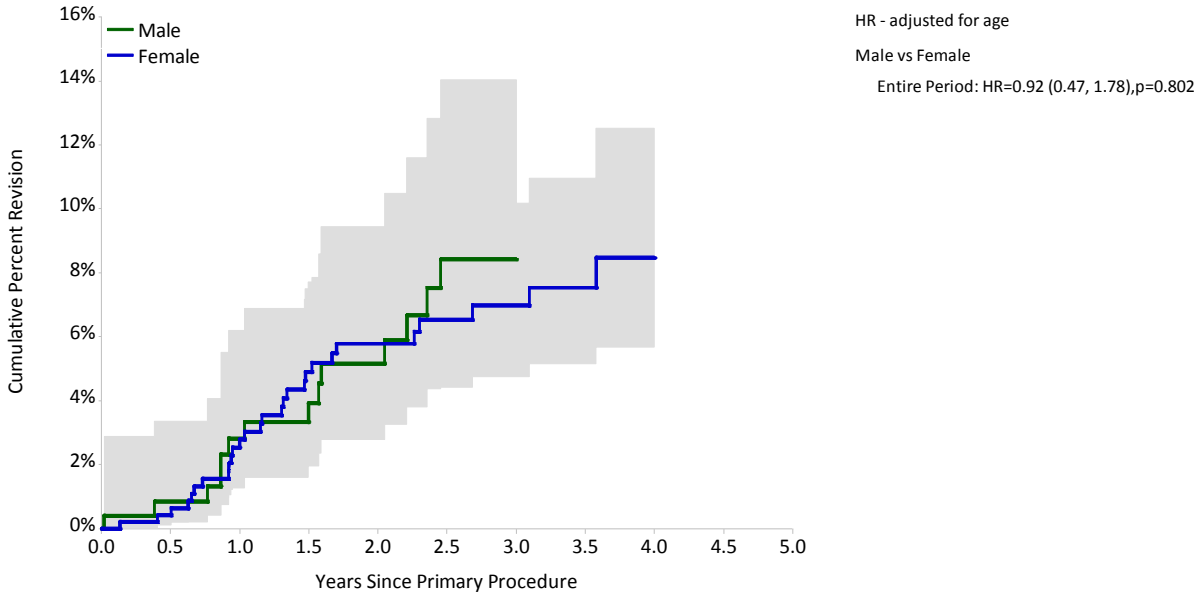
Table SP25: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Male	15	243	550	2.73 (1.53, 4.50)
Female	28	495	1163	2.41 (1.60, 3.48)
TOTAL	**43**	**738**	**1712**	**2.51 (1.82, 3.38)**

Table SP26: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Gender (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	2.8 (1.3, 6.2)	5.2 (2.8, 9.4)	8.4 (5.0, 14.0)		
Female	2.8 (1.6, 4.9)	5.8 (3.9, 8.6)	7.0 (4.8, 10.2)	8.5 (5.7, 12.5)	

Figure SP10: Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	243	191	134	78	25	3
Female	495	394	285	176	65	5

Table SP27: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Humeral Head and Stem (Primary Diagnosis OA)

Humeral Head	Humeral Stem	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Aequalis	Aequalis	4	97	216	1.85 (0.50, 4.74)
Bigliani/Flatow	Bigliani/Flatow	2	53	112	1.78 (0.22, 6.44)
Global AP	Global AP	3	68	95	3.17 (0.65, 9.28)
Global Advantage	Global Advantage	6	163	479	1.25 (0.46, 2.72)
Global Advantage	Global FX	3	22	49	6.17 (1.27, 18.03)
SMR	SMR	20	269	622	3.22 (1.96, 4.97)
Other (16)		5	66	140	3.58 (1.16, 8.36)
TOTAL		**43**	**738**	**1712**	**2.51 (1.82, 3.38)**

Note: Only combinations with over 20 procedures have been listed.

Table SP28: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Humeral Head and Stem (Primary Diagnosis OA)

Humeral Head	Humeral Stem	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Aequalis	Aequalis	2.5 (0.6, 9.5)	5.5 (2.1, 14.2)	5.5 (2.1, 14.2)		
Bigliani/Flatow	Bigliani/Flatow	4.0 (1.0, 15.1)	4.0 (1.0, 15.1)	4.0 (1.0, 15.1)		
Global AP	Global AP	0.0 (0.0, 0.0)	11.1 (3.7, 30.6)			
Global Advantage	Global Advantage	0.0 (0.0, 0.0)	1.4 (0.4, 5.6)	3.0 (1.2, 7.9)		
Global Advantage	Global FX	5.3 (0.8, 31.9)	10.8 (2.8, 36.9)	19.8 (6.5, 51.3)		
SMR	SMR	4.2 (2.3, 7.7)	7.1 (4.4, 11.4)	9.3 (5.9, 14.4)		
Other (16)		5.4 (1.8, 15.8)	7.7 (2.9, 19.5)	10.9 (4.5, 25.0)		

Note: Only combinations with over 20 procedures have been listed.

Fracture/Dislocation

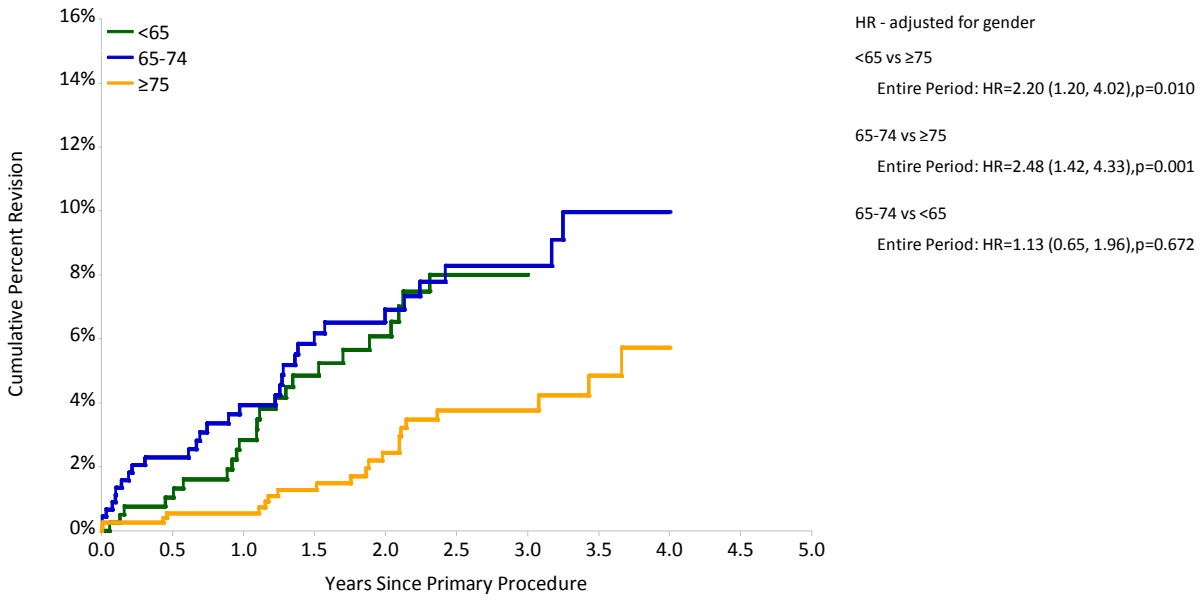
Table SP29: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Age (Primary Diagnosis Fracture/Dislocation)

Age	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
<65	23	406	856	2.69 (1.70, 4.03)
65-74	30	452	958	3.13 (2.11, 4.47)
≥75	21	783	1629	1.29 (0.80, 1.97)
TOTAL	**74**	**1641**	**3443**	**2.15 (1.69, 2.70)**

Table SP30: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Age (Primary Diagnosis Fracture/Dislocation)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	2.8 (1.5, 5.2)	6.1 (3.9, 9.4)	8.0 (5.3, 11.9)		
65-74	3.9 (2.4, 6.4)	6.9 (4.7, 10.1)	8.3 (5.7, 11.9)	10.0 (6.8, 14.5)	
≥75	0.6 (0.2, 1.5)	2.4 (1.4, 4.2)	3.8 (2.4, 6.0)	5.7 (3.5, 9.4)	

Figure SP11: Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Age (Primary Diagnosis Fracture/Dislocation)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	406	306	210	121	29	0
65-74	452	327	231	127	51	7
≥75	783	584	391	220	73	7

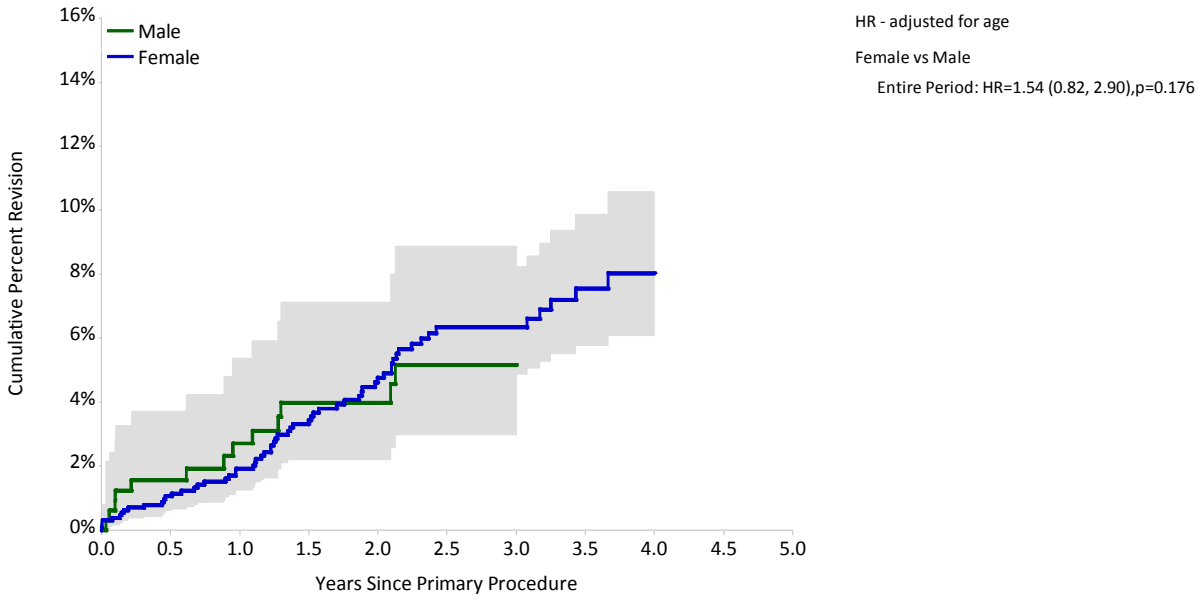
Table SP31: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Gender (Primary Diagnosis Fracture/Dislocation)

Gender	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Male	13	328	700	1.86 (0.99, 3.17)
Female	61	1313	2742	2.22 (1.70, 2.86)
TOTAL	**74**	**1641**	**3443**	**2.15 (1.69, 2.70)**

Table SP32: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Gender (Primary Diagnosis Fracture/Dislocation)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	2.7 (1.4, 5.4)	4.0 (2.2, 7.1)	5.2 (3.0, 8.9)		
Female	1.9 (1.3, 2.9)	4.8 (3.6, 6.3)	6.3 (4.9, 8.2)	8.0 (6.1, 10.6)	

Figure SP12: Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Gender (Primary Diagnosis Fracture/Dislocation)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	328	243	173	99	31	1
Female	1313	974	659	369	122	13

Table SP33: Revision Rates of Primary Stemmed Hemi Shoulder Replacement by Humeral Head and Stem (Primary Diagnosis Fracture/Dislocation)

Humeral Head	Humeral Stem	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Aequalis	Aequalis	5	258	492	1.02 (0.33, 2.37)
Bigliani/Flatow	Bigliani/Flatow	3	192	359	0.84 (0.17, 2.44)
Global Advantage	Global Advantage	5	49	131	3.83 (1.24, 8.93)
Global Advantage	Global FX	23	474	1109	2.07 (1.31, 3.11)
SMR	SMR	33	535	1076	3.07 (2.11, 4.31)
Solar	Solar	3	35	76	3.97 (0.82, 11.60)
Other (15)		2	98	200	1.00 (0.12, 3.61)
TOTAL		**74**	**1641**	**3443**	**2.15 (1.69, 2.70)**

Note: Only combinations with over 30 procedures have been listed.

Table SP34: Yearly Cumulative Percent Revision of Primary Stemmed Hemi Shoulder Replacement by Humeral Head and Stem (Primary Diagnosis Fracture/Dislocation)

Humeral Head	Humeral Stem	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Aequalis	Aequalis	1.3 (0.4, 4.1)	2.6 (1.1, 6.1)	2.6 (1.1, 6.1)		
Bigliani/Flatow	Bigliani/Flatow	0.5 (0.1, 3.7)	2.2 (0.7, 6.9)	2.2 (0.7, 6.9)		
Global Advantage	Global Advantage	4.3 (1.1, 16.0)	6.7 (2.2, 19.3)	9.4 (3.6, 23.3)		
Global Advantage	Global FX	1.7 (0.8, 3.4)	4.1 (2.5, 6.8)	6.4 (4.2, 9.7)	7.7 (5.1, 11.6)	
SMR	SMR	2.9 (1.7, 4.9)	6.4 (4.4, 9.4)	8.3 (5.9, 11.8)		
Solar	Solar	6.4 (1.6, 23.1)	9.8 (3.3, 27.5)	9.8 (3.3, 27.5)	9.8 (3.3, 27.5)	
Other (15)		1.4 (0.2, 9.5)	2.8 (0.7, 10.7)	2.8 (0.7, 10.7)	2.8 (0.7, 10.7)	

Note: Only combinations with over 30 procedures have been listed.

PRIMARY TOTAL SHOULDER REPLACEMENT

Classes of Total Shoulder Replacement

The Registry sub-categorises primary total shoulder replacement into four classes. These are defined as:

1. **Total resurfacing** includes glenoid replacement and the use of a humeral prosthesis that replaces the humeral articular surface without resecting the head.
2. **Total conventional** includes glenoid replacement combined with resection of the humeral head and replacement with a stemmed humeral prosthesis and humeral head prosthesis.
3. **Total reverse** includes glenoid replacement with a glenoid head prosthesis combined with resection of the humeral head and replacement with a stemmed humeral prosthesis and humeral cup prosthesis.

Table ST1: Primary Total Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	5814	63.5	15	97	74	73.5	8.7
Male	3336	36.5	25	96	70	69.8	9.6
TOTAL	**9150**	**100.0**	**15**	**97**	**73**	**72.1**	**9.2**

Figure ST1: Primary Total Shoulder by Age and Gender

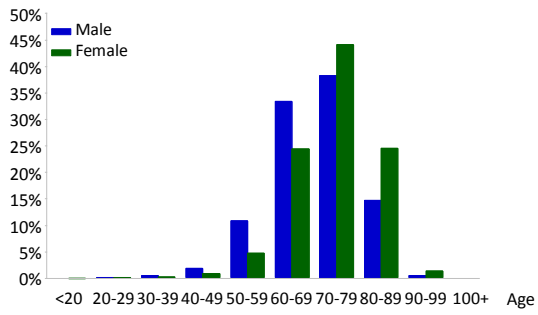


Table ST2: Primary Total Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	6778	74.1
Rotator Cuff Arthropathy	1266	13.8
Fracture/Dislocation	625	6.8
Rheumatoid Arthritis	255	2.8
Osteonecrosis	119	1.3
Other Inflammatory Arthritis	54	0.6
Tumour	48	0.5
Other	5	0.1
TOTAL	**9150**	**100.0**

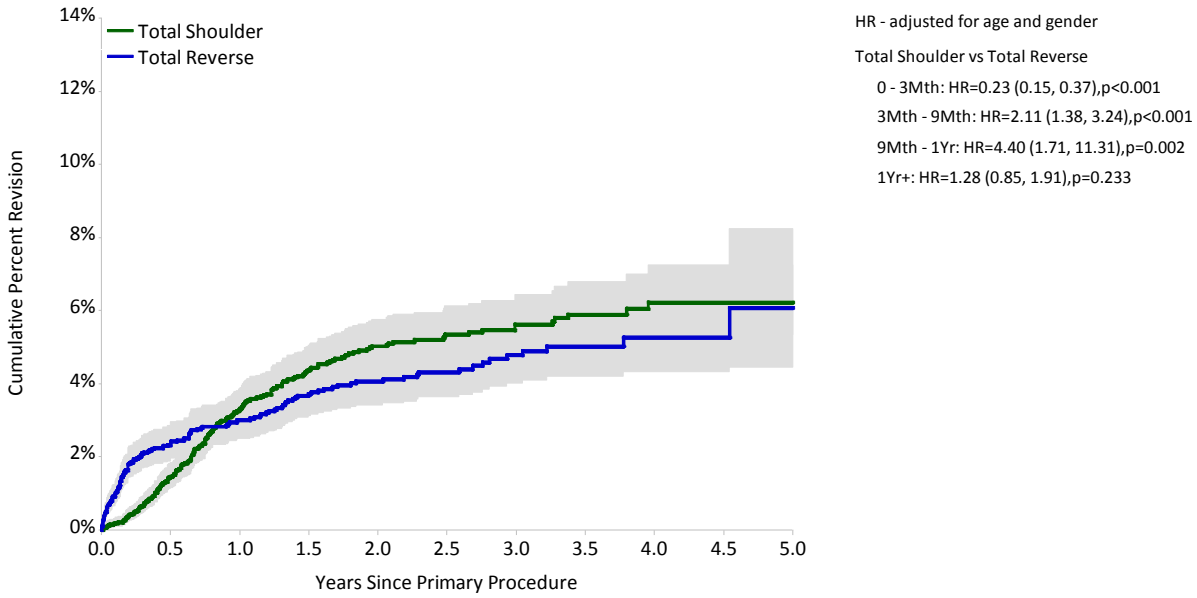
Table ST3: Revision Rates of Primary Total Shoulder Replacement by Shoulder Class

Shoulder Class	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Total Resurfacing	7	85	155	4.53 (1.82, 9.33)
Total Conventional	214	5055	10242	2.09 (1.82, 2.39)
Total Reverse	147	4010	7372	1.99 (1.68, 2.34)
TOTAL SHOULDER	**368**	**9150**	**17769**	**2.07 (1.86, 2.29)**

Table ST4: Yearly Cumulative Percent Revision of Primary Total Shoulder Replacement by Shoulder Class

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Total Resurfacing	4.2 (1.4, 12.7)	8.5 (3.5, 19.8)	12.5 (5.3, 27.7)	17.4 (7.8, 36.2)	
Total Conventional	3.3 (2.8, 3.9)	5.0 (4.4, 5.8)	5.6 (4.9, 6.4)	6.2 (5.3, 7.2)	6.2 (5.3, 7.2)
Total Reverse	3.0 (2.5, 3.6)	4.1 (3.4, 4.8)	4.8 (4.0, 5.7)	5.3 (4.3, 6.4)	6.1 (4.5, 8.2)
TOTAL SHOULDER	3.2 (2.8, 3.6)	4.7 (4.2, 5.2)	5.3 (4.8, 5.9)	5.9 (5.3, 6.7)	6.2 (5.4, 7.2)

Figure ST2: Cumulative Percent Revision of Primary Total Shoulder Replacement by Shoulder Class



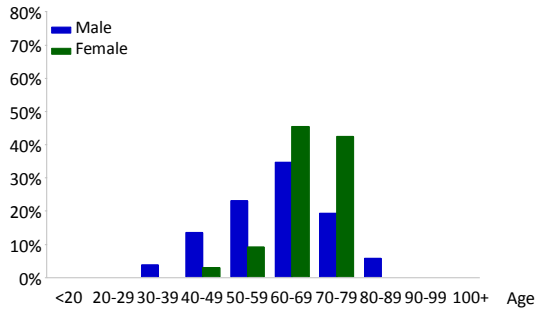
Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Total Shoulder	5055	3607	2355	1283	499	89
Total Reverse	4010	2627	1683	864	308	51

Primary Total Resurfacing Shoulder Replacement

Table ST5: Primary Total Resurfacing Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	33	38.8	46	79	67	65.9	7.3
Male	52	61.2	35	83	63	61.5	11.7
TOTAL	**85**	**100.0**	**35**	**83**	**64**	**63.2**	**10.4**

Figure ST3: Primary Total Resurfacing Shoulder by Age and Gender



TableST6: Primary Total Resurfacing Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	78	91.8
Rheumatoid Arthritis	3	3.5
Fracture/Dislocation	2	2.4
Other Inflammatory Arthritis	1	1.2
Other	1	1.2
TOTAL	**85**	**100.0**

Table ST7: Most Common Humeral Head Prostheses used in Primary Total Resurfacing Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
4	SMR	5	SMR	5	Epoca RH	7	Global CAP	30	Global CAP
2	Copeland	3	Aequalis	3	SMR	5	SMR	3	SMR
2	Global CAP	2	Copeland	2	Copeland	2	Epoca RH	1	Epoca RH
		1	Global CAP	1	Aequalis	1	Aequalis		
				1	Eclipse				
Most Used									
8	(3) 100.0%	11	(4) 100.0%	12	(5) 100.0%	15	(4) 100.0%	34	(3) 100.0%

Table ST8: Most Common Glenoid Prostheses used in Primary Total Resurfacing Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
4	SMR	5	SMR	5	Epoca	7	Global	30	Global
2	Global	3	Aequalis	3	SMR	5	SMR	3	SMR
1	Bio-Modular	2	Copeland	2	Bio-Modular	2	Epoca	1	Epoca
1	Univers 3D	1	Global	1	Aequalis	1	Aequalis		
				1	Univers 3D				
Most Used									
8	(4) 100.0%	11	(4) 100.0%	12	(5) 100.0%	15	(4) 100.0%	34	(3) 100.0%

Primary Total Conventional Shoulder Replacement

Table ST9: Primary Total Conventional Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	3059	60.5	15	94	72	71.3	8.8
Male	1996	39.5	25	93	67	67.1	9.3
TOTAL	**5055**	**100.0**	**15**	**94**	**70**	**69.6**	**9.3**

Figure ST4: Primary Total Conventional Shoulder by Age and Gender

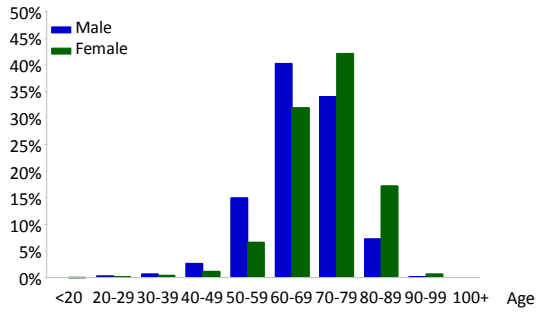


Table ST10: Primary Total Conventional Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	4672	92.4
Rheumatoid Arthritis	135	2.7
Fracture/Dislocation	76	1.5
Osteonecrosis	76	1.5
Other Inflammatory Arthritis	34	0.7
Tumour	34	0.7
Rotator Cuff Arthropathy	25	0.5
Other	3	0.1
TOTAL	**5055**	**100.0**

Table ST11: Most Common Humeral Stem Prostheses used in Primary Total Conventional Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
146	SMR	298	SMR	335	SMR	395	SMR	401	SMR
137	Global Advantage	167	Aequalis	299	Global AP	271	Global AP	298	Global AP
59	Aequalis	117	Global Advantage	209	Aequalis	253	Aequalis	253	Aequalis
46	Bigliani/Flatow	91	Global AP	110	Bigliani/Flatow	146	Bigliani/Flatow	148	Bigliani/Flatow
24	Solar	77	Bigliani/Flatow	43	Global Advantage	65	Global Advantage	44	Affinis
16	Affinis	32	Solar	35	Affinis	34	Solar	40	Global Advantage
16	Univers 3D	27	Affinis	28	Solar	26	Affinis	19	Solar
4	Bio-Modular	11	Univers 3D	23	Trabecular Metal	10	Mets	15	Vaios
2	Cofield 2	10	Cofield 2	17	Promos	8	Epoca	14	Mets
2	Global AP	7	Promos	12	Cofield 2	7	Cofield 2	11	Ascend
Ten Most Used									
452	(10) 98.7%	837	(10) 98.7%	1111	(10) 97.9%	1215	(10) 98.6%	1243	(10) 96.7%
Remainder									
6	(4) 1.3%	11	(6) 1.3%	24	(7) 2.1%	17	(8) 1.4%	42	(10) 3.3%
TOTAL									
458	(14) 100.0%	848	(16) 100.0%	1135	(17) 100.0%	1232	(18) 100.0%	1285	(20) 100.0%

Table ST12: Most Common Glenoid Component used in Primary Total Conventional Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
142	SMR	294	SMR	339	Global	389	SMR	402	SMR
139	Global	209	Global	330	SMR	328	Global	339	Global
59	Aequalis	167	Aequalis	209	Aequalis	256	Aequalis	264	Aequalis
48	Bigliani/Flatow	79	Bigliani/Flatow	133	Bigliani/Flatow	149	Bigliani/Flatow	148	Bigliani/Flatow
24	Solar	32	Solar	35	Affinis	34	Solar	44	Affinis
16	Affinis	27	Affinis	28	Solar	26	Affinis	19	Solar
16	Univers 3D	11	Univers 3D	17	Promos	10	Bayley-Walker	14	Bayley-Walker
4	Bio-Modular	10	Cofield 2	12	Cofield 2	9	Global Advantage	14	Vaios
4	Lima Glenoid	7	Promos	7	Epoca	8	Epoca	11	Epoca
2	Cofield 2	4	Epoca	7	Lima Glenoid	7	Cofield 2	10	Comprehensive
Ten Most Used									
454	(10) 99.1%	840	(10) 99.1%	1117	(10) 98.4%	1216	(10) 98.7%	1265	(10) 98.4%
Remainder									
4	(3) 0.9%	8	(5) 0.9%	18	(6) 1.6%	16	(6) 1.3%	20	(7) 1.6%
TOTAL									
458	(13) 100.0%	848	(15) 100.0%	1135	(16) 100.0%	1232	(16) 100.0%	1285	(17) 100.0%

Table ST13: Revision Rates of Primary Total Conventional Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Fracture/Dislocation	6	76	139	4.32 (1.59, 9.41)
Osteoarthritis	192	4672	9502	2.02 (1.74, 2.33)
Osteonecrosis	6	76	165	3.65 (1.34, 7.94)
Rheumatoid Arthritis	3	135	289	1.04 (0.21, 3.04)
Other (4)	7	96	149	4.70 (1.89, 9.69)
TOTAL	**214**	**5055**	**10242**	**2.09 (1.82, 2.39)**

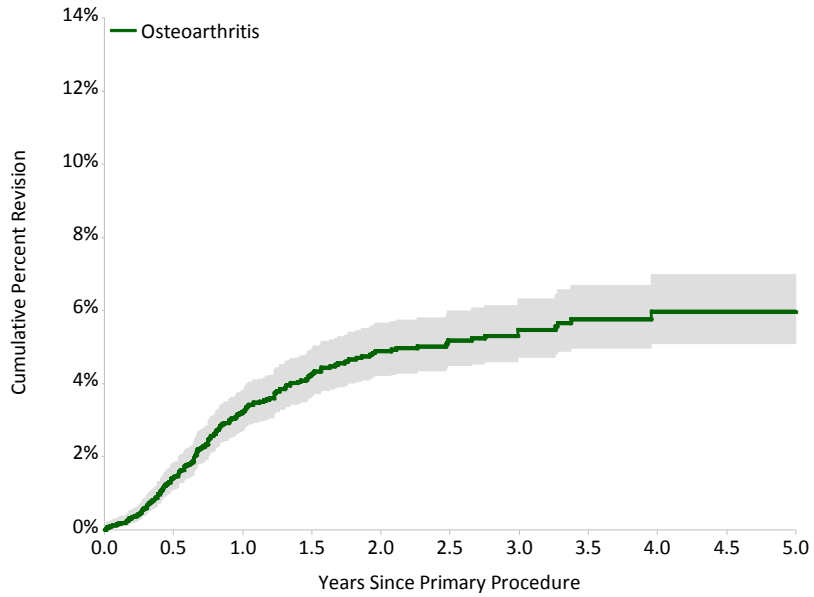
Note: Only Primary Diagnoses with over 50 procedures have been listed.

Table ST14: Yearly Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Primary Diagnosis

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Fracture/Dislocation	9.5 (4.3, 20.0)	9.5 (4.3, 20.0)	9.5 (4.3, 20.0)		
Osteoarthritis	3.2 (2.7, 3.8)	4.9 (4.2, 5.6)	5.5 (4.7, 6.3)	6.0 (5.1, 7.0)	6.0 (5.1, 7.0)
Osteonecrosis	4.6 (1.5, 13.5)	8.3 (3.5, 18.9)	10.6 (4.8, 22.3)		
Rheumatoid Arthritis	0.9 (0.1, 6.4)	1.9 (0.5, 7.3)			
Other (4)	4.9 (1.9, 12.7)	11.5 (5.4, 23.6)	11.5 (5.4, 23.6)		

Note: Only Primary Diagnoses with over 50 procedures have been listed.

Figure ST5: Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Primary Diagnosis



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis	4672	3334	2183	1205	469	83

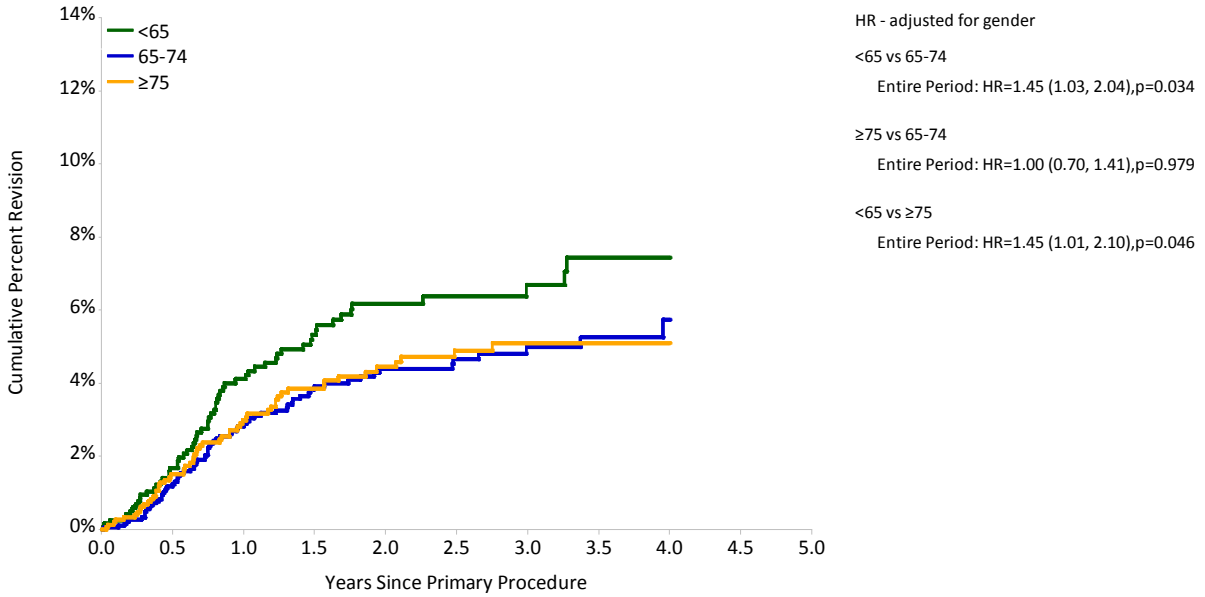
Table ST15: Revision Rates of Primary Total Conventional Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
<65	63	1216	2448	2.57 (1.98, 3.29)
65-74	72	1938	3960	1.82 (1.42, 2.29)
≥75	57	1518	3094	1.84 (1.40, 2.39)
TOTAL	**192**	**4672**	**9502**	**2.02 (1.74, 2.33)**

Table ST16: Yearly Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Age (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	4.1 (3.1, 5.5)	6.2 (4.8, 7.9)	6.7 (5.2, 8.6)	7.4 (5.7, 9.7)	
65-74	2.8 (2.1, 3.7)	4.4 (3.5, 5.6)	5.0 (3.9, 6.4)	5.7 (4.3, 7.6)	
≥75	3.0 (2.2, 4.1)	4.4 (3.4, 5.8)	5.1 (3.9, 6.6)	5.1 (3.9, 6.6)	

Figure ST6: Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Age (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	1216	867	566	301	125	20
65-74	1938	1386	907	510	187	37
≥75	1518	1081	710	394	157	26

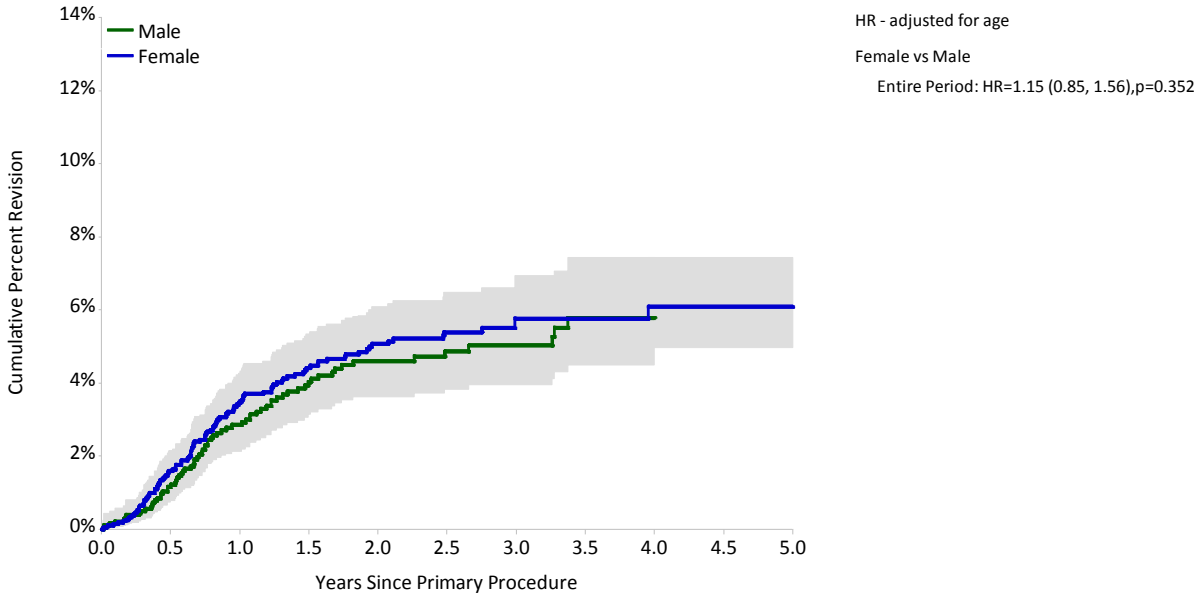
Table ST17: Revision Rates of Primary Total Conventional Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Male	73	1874	3785	1.93 (1.51, 2.43)
Female	119	2798	5717	2.08 (1.72, 2.49)
TOTAL	**192**	**4672**	**9502**	**2.02 (1.74, 2.33)**

Table ST18: Yearly Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Gender (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	2.9 (2.1, 3.8)	4.6 (3.6, 5.8)	5.0 (4.0, 6.4)	5.8 (4.5, 7.4)	
Female	3.5 (2.8, 4.3)	5.1 (4.2, 6.1)	5.8 (4.8, 6.9)	6.1 (5.0, 7.4)	6.1 (5.0, 7.4)

Figure ST7: Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	1874	1347	860	477	185	30
Female	2798	1987	1323	728	284	53

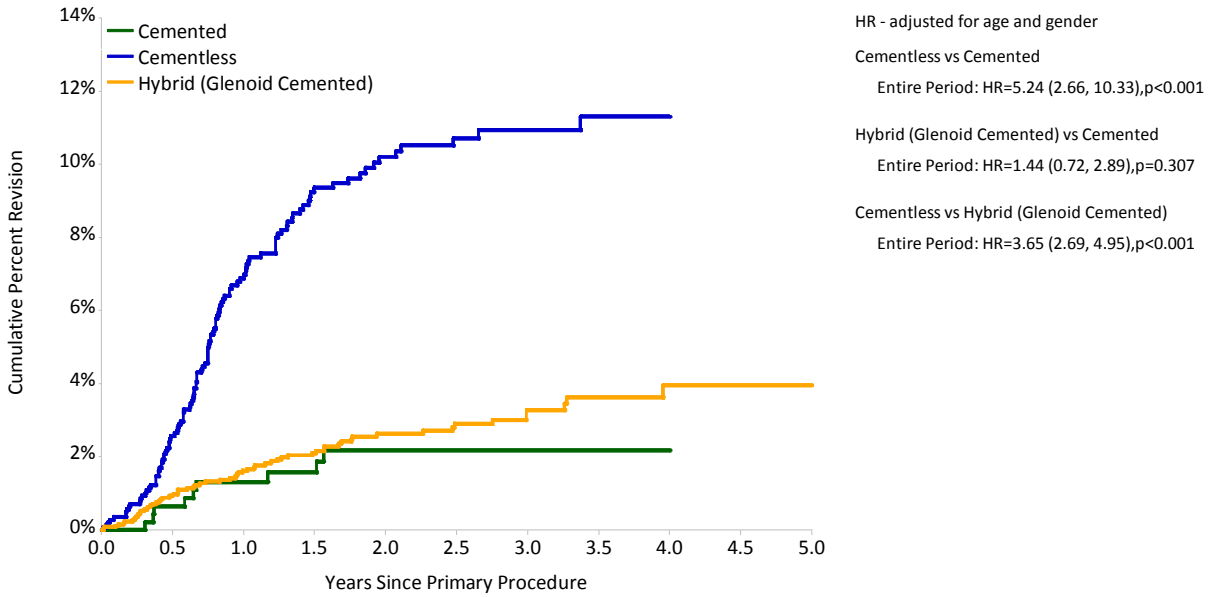
Table ST19: Revision Rates of Primary Total Conventional Shoulder Replacement by Fixation (Primary Diagnosis OA)

Fixation	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Cemented	9	510	1167	0.77 (0.35, 1.46)
Cementless	118	1450	2719	4.34 (3.59, 5.20)
Hybrid (Glenoid Cemented)	64	2689	5579	1.15 (0.88, 1.46)
Hybrid (Glenoid Cementless)	1	23	37	2.73 (0.07, 15.22)
TOTAL	**192**	**4672**	**9502**	**2.02 (1.74, 2.33)**

Table ST20: Yearly Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Fixation (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Cemented	1.3 (0.6, 2.9)	2.2 (1.1, 4.2)	2.2 (1.1, 4.2)	2.2 (1.1, 4.2)	
Cementless	6.9 (5.6, 8.5)	10.2 (8.5, 12.2)	10.9 (9.1, 13.1)	11.3 (9.4, 13.6)	
Hybrid (Glenoid Cemented)	1.6 (1.2, 2.2)	2.6 (2.0, 3.4)	3.3 (2.5, 4.3)	4.0 (2.9, 5.3)	4.0 (2.9, 5.3)
Hybrid (Glenoid Cementless)	5.0 (0.7, 30.5)	5.0 (0.7, 30.5)	5.0 (0.7, 30.5)	5.0 (0.7, 30.5)	

Figure ST8: Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Fixation (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Cemented	510	402	279	173	67	9
Cementless	1450	965	591	321	125	23
Hybrid (Glenoid Cemented)	2689	1955	1307	707	273	51

Table ST21: Revision Rates of Primary Total Conventional Shoulder Replacement by Humeral Stem and Glenoid

Humeral Stem	Glenoid	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Aequalis	Aequalis	20	943	1811	1.10 (0.67, 1.71)
Affinis	Affinis	3	152	326	0.92 (0.19, 2.69)
Bigliani/Flatow	Bigliani/Flatow	17	540	1046	1.63 (0.95, 2.60)
Global AP	Global	15	947	1540	0.97 (0.55, 1.61)
Global Advantage	Global	16	438	1396	1.15 (0.66, 1.86)
SMR	SMR	128	1579	3134	4.08 (3.41, 4.86)
Solar	Solar	0	137	337	0.00 (0.00, 1.09)
Other (30)		15	319	653	2.30 (1.28, 3.79)
TOTAL		**214**	**5055**	**10242**	**2.09 (1.82, 2.39)**

Note: Only combinations with over 50 procedures have been listed.

Table ST22: Yearly Cumulative Percent Revision of Primary Total Conventional Shoulder Replacement by Humeral Stem and Glenoid

Humeral Stem	Glenoid	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Aequalis	Aequalis	1.6 (0.9, 2.8)	2.5 (1.6, 4.0)	2.5 (1.6, 4.0)	4.8 (2.2, 10.1)	
Affinis	Affinis	0.0 (0.0, 0.0)	1.2 (0.2, 8.2)	4.1 (1.3, 12.4)		
Bigliani/Flatow	Bigliani/Flatow	2.7 (1.6, 4.7)	3.4 (2.0, 5.7)	4.8 (2.8, 8.2)	4.8 (2.8, 8.2)	
Global AP	Global	1.4 (0.8, 2.5)	2.2 (1.3, 3.6)	2.2 (1.3, 3.6)		
Global Advantage	Global	1.7 (0.8, 3.6)	3.3 (1.9, 5.6)	4.0 (2.4, 6.5)	4.5 (2.7, 7.3)	
SMR	SMR	6.7 (5.5, 8.1)	9.8 (8.2, 11.6)	10.5 (8.8, 12.4)	11.0 (9.3, 13.2)	
Solar	Solar	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
Other (30)		3.2 (1.7, 6.1)	6.1 (3.7, 10.1)	6.1 (3.7, 10.1)	6.1 (3.7, 10.1)	

Note: Only combinations with over 50 procedures have been listed.

Primary Total Reverse Shoulder Replacement

Table ST23: Primary Total Reverse Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2722	67.9	32	97	77	76.1	7.8
Male	1288	32.1	46	96	75	74.3	7.9
TOTAL	**4010**	**100.0**	**32**	**97**	**76**	**75.5**	**7.9**

Figure ST9: Primary Total Reverse Shoulder by Age and Gender

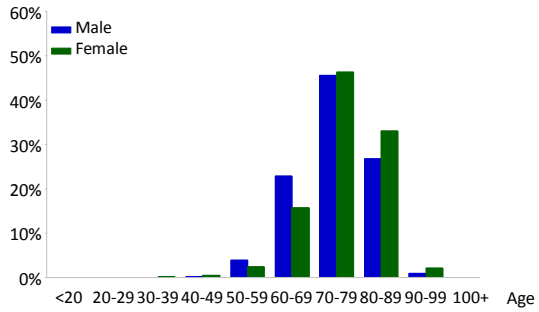


Table ST24: Primary Total Reverse Shoulder by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	2028	50.6
Rotator Cuff Arthropathy	1241	30.9
Fracture/Dislocation	547	13.6
Rheumatoid Arthritis	117	2.9
Osteonecrosis	43	1.1
Other Inflammatory Arthritis	19	0.5
Tumour	14	0.3
Other	1	0.0
TOTAL	**4010**	**100.0**

Table ST25: Most Common Humeral Stem Prostheses used in Primary Total Reverse Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
124	SMR	261	SMR	319	Delta Xtend	361	SMR	473	SMR
70	Delta Xtend	251	Delta Xtend	300	SMR	332	Delta Xtend	421	Delta Xtend
39	Delta CTA	75	Aequalis	113	Aequalis	158	Aequalis	197	Aequalis
34	Aequalis	42	Trabecular Metal	57	Trabecular Metal	68	Trabecular Metal	105	Trabecular Metal
22	Trabecular Metal	21	Delta CTA	32	Promos	20	Promos	15	Vaios
2	Generic Humeral Stem	2	Custom Made (Lima)	3	Delta CTA	4	Comprehensive Reverse	8	Comprehensive Reverse
1	Custom Made (Lima)	1	Promos			3	Delta CTA	7	Comprehensive SS
						1	Affinis	3	Promos
								1	Equinoxe
Most Used									
292	(7) 100.0%	653	(7) 100.0%	824	(6) 100.0%	947	(8) 100.0%	1230	(9) 100.0%

Table ST26: Most Common Glenoid Component used in Primary Total Reverse Shoulder Replacement

2007		2008		2009		2010		2011	
N	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**	**N**	**Model**
126	SMR	263	SMR	319	Delta Xtend	361	SMR	473	SMR
71	Delta Xtend	251	Delta Xtend	300	SMR	332	Delta Xtend	421	Delta Xtend
39	Delta CTA	75	Aequalis	113	Aequalis	158	Aequalis	197	Aequalis
34	Aequalis	42	Trabecular Metal	57	Trabecular Metal	68	Trabecular Metal	105	Trabecular Metal
22	Trabecular Metal	21	Delta CTA	32	Promos	20	Promos	15	Comprehensive Reverse
		1	Promos	3	Delta CTA	4	Comprehensive Reverse	15	Vaios
						3	Delta CTA	3	Promos
						1	Affinis	1	Equinoxe
Most Used									
292	(5) 100.0%	653	(6) 100.0%	824	(6) 100.0%	947	(8) 100.0%	1230	(8) 100.0%

Table ST27: Revision Rates of Primary Total Reverse Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Fracture/Dislocation	21	547	938	2.24 (1.39, 3.42)
Osteoarthritis	68	2028	3998	1.70 (1.32, 2.16)
Rheumatoid Arthritis	7	117	243	2.88 (1.16, 5.93)
Rotator Cuff Arthropathy	48	1241	2032	2.36 (1.74, 3.13)
Other (4)	3	77	160	1.87 (0.39, 5.47)
TOTAL	**147**	**4010**	**7372**	**1.99 (1.68, 2.34)**

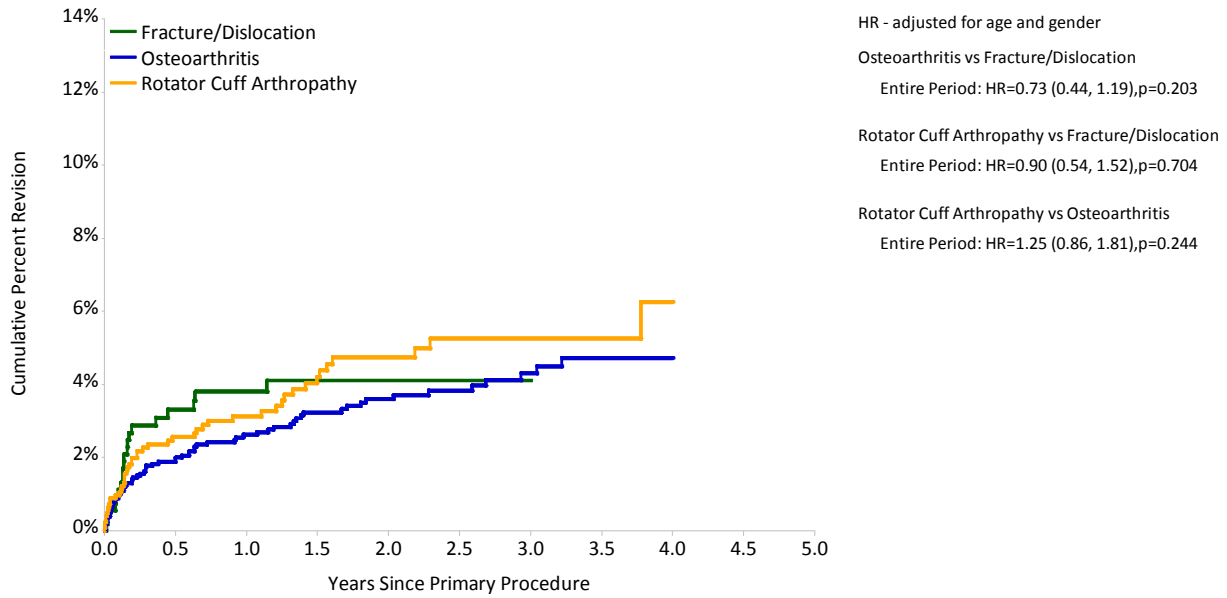
Note: Only Primary Diagnoses with over 50 procedures have been listed.

Table ST28: Yearly Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Primary Diagnosis

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Fracture/Dislocation	3.8 (2.4, 5.9)	4.1 (2.7, 6.3)	4.1 (2.7, 6.3)		
Osteoarthritis	2.6 (2.0, 3.5)	3.6 (2.8, 4.6)	4.3 (3.3, 5.6)	4.7 (3.6, 6.1)	
Rheumatoid Arthritis	4.7 (2.0, 11.1)	6.0 (2.7, 12.9)			
Rotator Cuff Arthropathy	3.1 (2.3, 4.3)	4.7 (3.5, 6.4)	5.3 (3.9, 7.1)	6.3 (4.2, 9.3)	
Other (4)	2.8 (0.7, 10.9)	2.8 (0.7, 10.9)	6.3 (1.8, 20.4)		

Note: Only Primary Diagnoses with over 50 procedures have been listed.

Figure ST10: Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Primary Diagnosis



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Fracture/Dislocation	547	336	210	116	35	3
Osteoarthritis	2028	1415	941	504	178	23
Rotator Cuff Arthropathy	1241	740	434	193	77	21

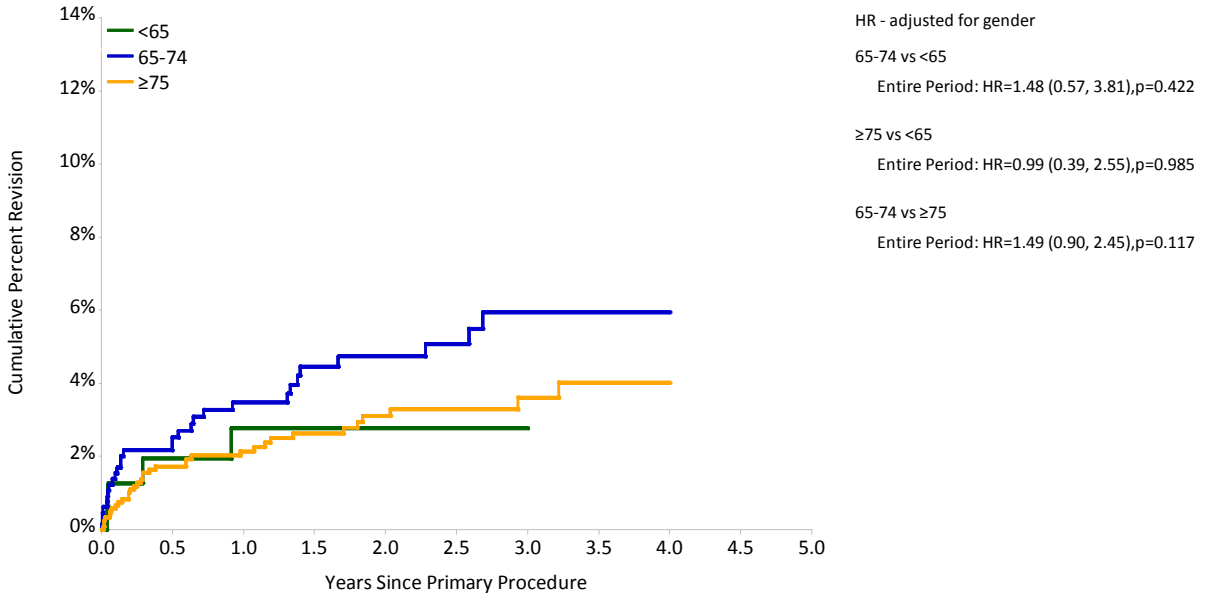
Table ST29: Revision Rates of Primary Total Reverse Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
<65	5	158	327	1.53 (0.50, 3.57)
65-74	29	655	1307	2.22 (1.49, 3.19)
≥75	34	1215	2364	1.44 (1.00, 2.01)
TOTAL	**68**	**2028**	**3998**	**1.70 (1.32, 2.16)**

Table ST30: Yearly Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Age (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	2.8 (1.0, 7.3)	2.8 (1.0, 7.3)	2.8 (1.0, 7.3)		
65-74	3.5 (2.3, 5.3)	4.7 (3.2, 6.9)	5.9 (4.1, 8.7)	5.9 (4.1, 8.7)	
≥75	2.1 (1.4, 3.2)	3.1 (2.2, 4.4)	3.6 (2.5, 5.2)	4.0 (2.7, 5.9)	

Figure ST11: Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Age (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
<65	158	112	74	43	18	4
65-74	655	454	318	171	65	6
≥75	1215	849	549	290	95	13

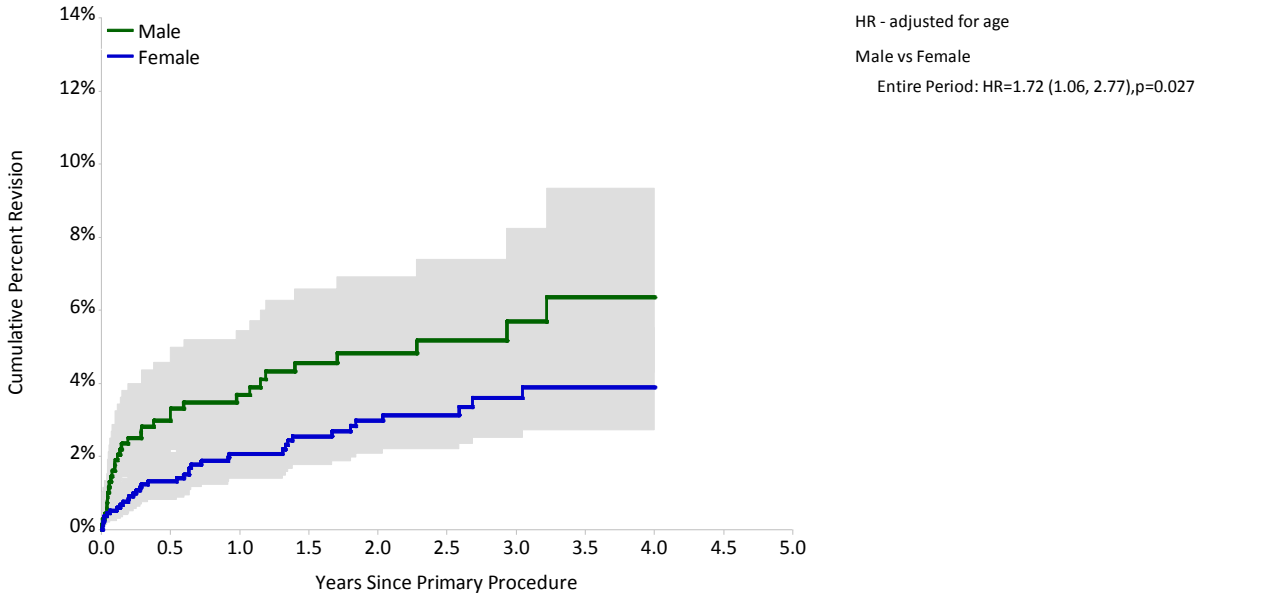
Table ST31: Revision Rates of Primary Total Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Male	32	690	1358	2.36 (1.61, 3.33)
Female	36	1338	2640	1.36 (0.96, 1.89)
TOTAL	**68**	**2028**	**3998**	**1.70 (1.32, 2.16)**

Table ST32: Yearly Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	3.7 (2.5, 5.5)	4.8 (3.4, 6.9)	5.7 (3.9, 8.2)	6.4 (4.3, 9.3)	
Female	2.1 (1.4, 3.1)	3.0 (2.1, 4.2)	3.6 (2.5, 5.1)	3.9 (2.7, 5.5)	

Figure ST12: Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Male	690	470	322	171	67	7
Female	1338	945	619	333	111	16

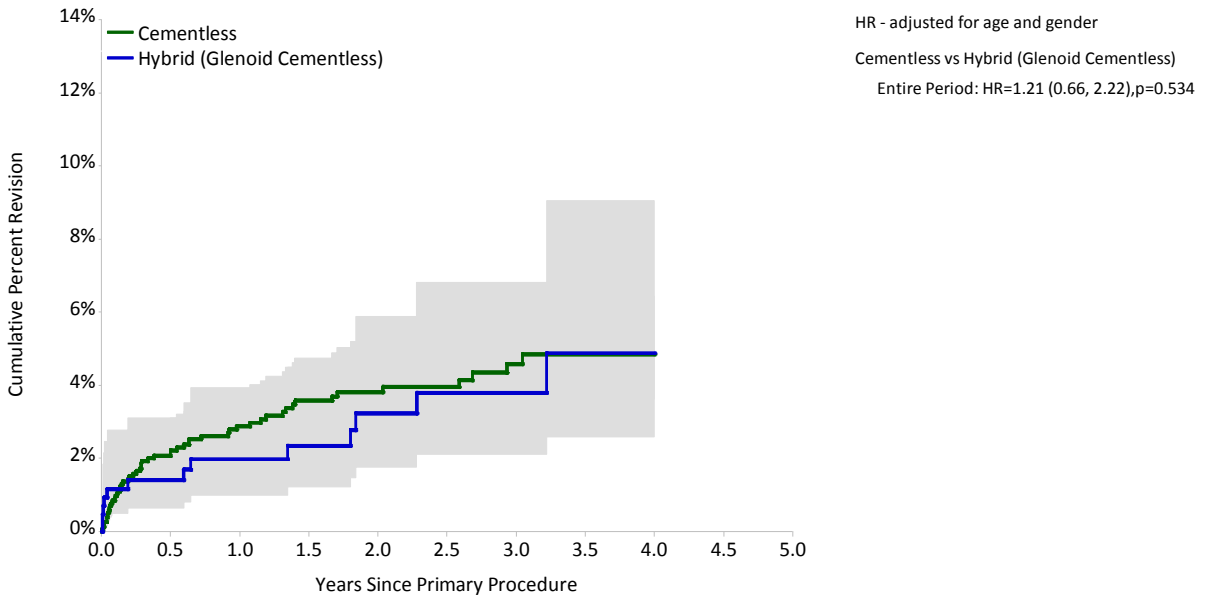
Table ST33: Revision Rates of Primary Total Reverse Shoulder Replacement by Fixation (Primary Diagnosis OA)

Fixation	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Cemented	0	39	100	0.00 (0.00, 3.69)
Cementless	55	1556	3040	1.81 (1.36, 2.36)
Hybrid (Glenoid Cemented)	0	4	6	0.00 (0.00, 65.60)
Hybrid (Glenoid Cementless)	13	429	853	1.52 (0.81, 2.61)
TOTAL	**68**	**2028**	**3998**	**1.70 (1.32, 2.16)**

Table ST34: Yearly Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Fixation (Primary Diagnosis OA)

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Cemented	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	
Cementless	2.9 (2.1, 3.9)	3.8 (2.9, 5.0)	4.6 (3.4, 6.1)	4.8 (3.6, 6.4)	
Hybrid (Glenoid Cemented)	0.0 (0.0, 0.0)				
Hybrid (Glenoid Cementless)	2.0 (1.0, 3.9)	3.2 (1.8, 5.9)	3.8 (2.1, 6.8)	4.9 (2.6, 9.1)	

Figure ST13: Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Fixation (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yrs	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Cementless	1556	1080	715	376	125	21
Hybrid (Glenoid Cementless)	429	299	203	109	45	2

Table ST35: Revision Rates of Primary Total Reverse Shoulder Replacement by Humeral Stem and Glenoid

Humeral Stem	Glenoid Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Aequalis	Aequalis	25	594	1047	2.39 (1.54, 3.52)
Delta CTA	Delta CTA	6	89	340	1.76 (0.65, 3.84)
Delta Xtend	Delta Xtend	33	1395	2517	1.31 (0.90, 1.84)
Promos	Promos	2	56	113	1.78 (0.22, 6.42)
SMR	SMR	70	1540	2809	2.49 (1.94, 3.15)
Trabecular Metal	Trabecular Metal	10	295	506	1.97 (0.95, 3.63)
Other (8)		1	41	39	2.54 (0.06, 14.13)
TOTAL		**147**	**4010**	**7372**	**1.99 (1.68, 2.34)**

Note: Only combinations with over 25 procedures have been listed.

Table ST36: Yearly Cumulative Percent Revision of Primary Total Reverse Shoulder Replacement by Humeral Stem and Glenoid

Humeral Stem	Glenoid Component	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Aequalis	Aequalis	3.1 (1.9, 5.0)	4.0 (2.6, 6.2)	5.8 (3.6, 9.1)	7.5 (4.2, 13.1)	
Delta CTA	Delta CTA	5.7 (2.4, 13.1)	5.7 (2.4, 13.1)	6.9 (3.2, 14.8)	6.9 (3.2, 14.8)	6.9 (3.2, 14.8)
Delta Xtend	Delta Xtend	2.1 (1.4, 3.0)	2.6 (1.8, 3.7)	2.9 (2.0, 4.1)	3.3 (2.2, 5.0)	
Promos	Promos	0.0 (0.0, 0.0)	4.8 (1.2, 17.9)			
SMR	SMR	3.8 (2.9, 5.0)	5.4 (4.3, 6.9)	5.9 (4.6, 7.5)	6.1 (4.8, 7.9)	
Trabecular Metal	Trabecular Metal	2.7 (1.3, 5.7)	3.5 (1.7, 7.3)	5.9 (2.9, 11.8)		
Other (8)		2.5 (0.4, 16.5)				

Note: Only combinations with over 25 procedures have been listed.

DEMOGRAPHICS OF REVISION

Table SR1: All Revision Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	828	59.7	33	94	72	71.2	10.4
Male	559	40.3	24	91	68	67.8	10.2
TOTAL	**1387**	**100.0**	**24**	**94**	**70**	**69.8**	**10.5**

Table SR2: All Revision Shoulder by Type of Revision

Type of Revision	Number	Percent
Humeral/Glenoid	477	34.4
Humeral Component	320	23.1
Glenoid Component	177	12.8
Head Only	170	12.3
Cup/Head	74	5.3
Cup Only	66	4.8
Cement Spacer	36	2.6
Head/Insert	30	2.2
Removal of Prostheses	17	1.2
Reoperation	6	0.4
Minor Components	4	0.3
Reinsertion of Components	4	0.3
Partial Resurfacing	3	0.2
Insert Only	2	0.1
Cement Only	1	0.1
TOTAL	**1387**	**100.0**

Table SR3: All Revision Shoulder by Reason for Revision

Reason for Revision	Number	Percent
Instability/Dislocation	376	27.1
Loosening/Lysis	344	24.8
Infection	145	10.5
Rotator Cuff Insufficiency	141	10.2
Pain	92	6.6
Fracture	83	6.0
Glenoid Erosion	64	4.6
Implant Breakage Glenoid	15	1.1
Wear Glenoid	14	1.0
Arthrofibrosis	13	0.9
Malposition	12	0.9
Wear Glenoid Insert	11	0.8
Incorrect Sizing	11	0.8
Dissociation	8	0.6
Progression Of Disease	8	0.6
Implant Breakage Humeral	7	0.5
Implant Breakage Glenoid Insert	7	0.5
Metal Sensitivity	6	0.4
Osteonecrosis	4	0.3
Tumour	3	0.2
Heterotopic Bone	2	0.1
Synovitis	1	0.1
Other	20	1.4
TOTAL	**1387**	**100.0**

Revision of Primary Partial Shoulder Replacement

Primary Hemi Resurfacing Shoulder Replacement

Table SPR1: Revision of Primary Hemi Resurfacing Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	24	47.1	33	88	70	68.5	11.2
Male	27	52.9	48	78	64	63.9	10.0
TOTAL	**51**	**100.0**	**33**	**88**	**66**	**66.1**	**10.7**

Figure SPR1: Revision of Primary Hemi Resurfacing Shoulder by Age and Gender

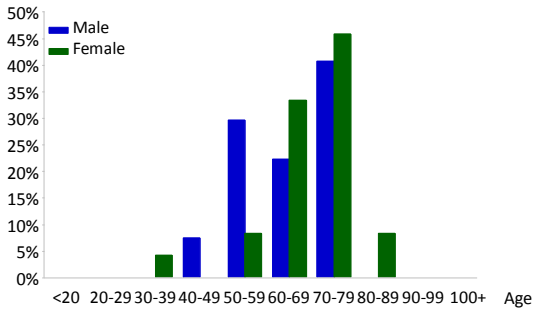


Table SPR2: Type of Revision of Primary Hemi Resurfacing Shoulder

Type of Revision	Number	Percent
Humeral/Glenoid	46	90.2
Glenoid Component	2	3.9
Humeral Component	2	3.9
Removal of Prostheses	1	2.0
TOTAL	**51**	**100.0**

Table SPR3: Reason for Revision of Known Primary Hemi Resurfacing Shoulder

Reason for Revision	Number	Percent
Pain	14	27.5
Rotator Cuff Insufficiency	11	21.6
Glenoid Erosion	10	19.6
Loosening/Lysis	7	13.7
Instability/Dislocation	5	9.8
Malposition	2	3.9
Infection	1	2.0
Implant Breakage Humeral	1	2.0
TOTAL	**51**	**100.0**

Primary Stemmed Hemi Shoulder Replacement

Table SPR4: Revision of Primary Stemmed Hemi Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	93	74.4	40	93	71	71.4	10.4
Male	32	25.6	43	82	64	62.8	10.2
TOTAL	**125**	**100.0**	**40**	**93**	**70**	**69.2**	**11.0**

Figure SPR2: Revision of Primary Stemmed Hemi Shoulder by Age and Gender

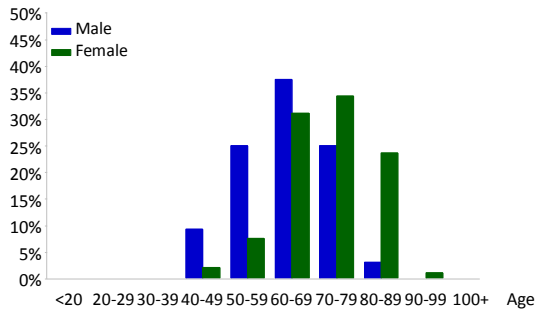


Table SPR5: Type of Revision of Primary Stemmed Hemi Shoulder

Type of Revision	Number	Percent
Humeral/Glenoid	76	60.8
Glenoid Component	19	15.2
Humeral Component	14	11.2
Head Only	10	8.0
Cement Spacer	2	1.6
Reoperation	2	1.6
Removal of Prostheses	2	1.6
TOTAL	**125**	**100.0**

Table SPR6: Reason for Revision of Primary Stemmed Hemi Shoulder

Reason for Revision	Number	Percent
Instability/Dislocation	32	25.6
Rotator Cuff Insufficiency	22	17.6
Glenoid Erosion	17	13.6
Pain	13	10.4
Fracture	12	9.6
Loosening/Lysis	10	8.0
Infection	7	5.6
Arthrofibrosis	5	4.0
Dissociation	2	1.6
Malposition	2	1.6
Incorrect Sizing	1	0.8
Other	2	1.6
TOTAL	**125**	**100.0**

Revision of Primary Total Shoulder Replacement

Primary Total Resurfacing Shoulder Replacement

Table STR1: Revision of Known Primary Total Resurfacing Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	5	71.4	63	74	72	69.8	4.7
Male	2	28.6	55	60	58	57.5	3.5
TOTAL	**7**	**100.0**	**55**	**74**	**67**	**66.3**	**7.3**

Figure STR1: Revision of Primary Total Resurfacing Shoulder by Age and Gender

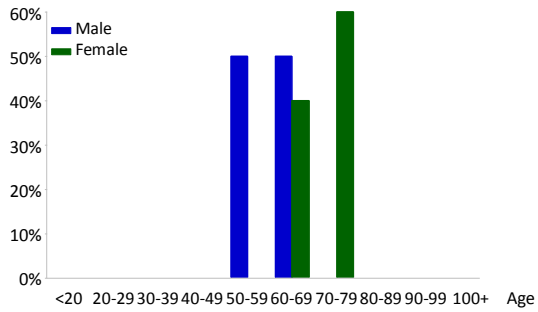


Table STR2: Type of Revision of Primary Total Resurfacing Shoulder

Type of Revision	Number	Percent
Humeral Component	4	57.1
Head Only	1	14.3
Insert Only	1	14.3
Cement Spacer	1	14.3
TOTAL	**7**	**100.0**

Table STR3: Reason for Revision of Primary Total Resurfacing Shoulder

Reason for Revision	Number	Percent
Instability/Dislocation	2	28.6
Infection	2	28.6
Loosening/Lysis	1	14.3
Fracture	1	14.3
Implant Breakage Glenoid Insert	1	14.3
TOTAL	**7**	**100.0**

Primary Total Conventional Shoulder Replacement

Table STR4: Revision of Primary Total Conventional Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	130	60.7	41	88	71	70.9	9.0
Male	84	39.3	46	90	68	67.6	8.0
TOTAL	**214**	**100.0**	**41**	**90**	**70**	**69.6**	**8.7**

Figure STR2: Revision of Primary Total Conventional Shoulder by Age and Gender

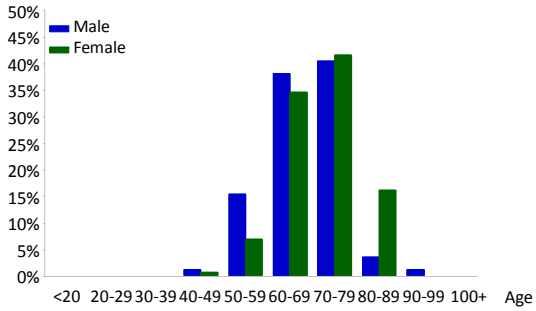


Table STR5: Type of Revision of Primary Total Conventional Shoulder

Type of Revision	Number	Percent
Humeral Component	101	47.2
Head Only	33	15.4
Humeral/Glenoid	27	12.6
Glenoid Component	24	11.2
Head/Insert	17	7.9
Cement Spacer	4	1.9
Reoperation	3	1.4
Removal of Prostheses	2	0.9
Minor Components	1	0.5
Reinsertion of Components	1	0.5
Cup/Head	1	0.5
TOTAL	**214**	**100.0**

Table STR6: Reason for Revision of Primary Total Conventional Shoulder

Reason for Revision	Number	Percent
Instability/Dislocation	80	37.4
Rotator Cuff Insufficiency	46	21.5
Loosening/Lysis	40	18.7
Infection	11	5.1
Implant Breakage Glenoid	8	3.7
Pain	6	2.8
Incorrect Sizing	5	2.3
Implant Breakage Glenoid Insert	5	2.3
Arthrofibrosis	4	1.9
Malposition	3	1.4
Metal Sensitivity	2	0.9
Wear Glenoid	1	0.5
Dissociation	1	0.5
Fracture	1	0.5
Other	1	0.5
TOTAL	**214**	**100.0**

Primary Total Reverse Shoulder Replacement

Table STR7: Revision of Primary Total Reverse Shoulder by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	81	55.1	57	90	77	75.8	7.8
Male	66	44.9	60	90	76	75.4	7.8
TOTAL	**147**	**100.0**	**57**	**90**	**76**	**75.6**	**7.8**

Figure STR3: Revision of Primary Total Reverse Shoulder by Age and Gender

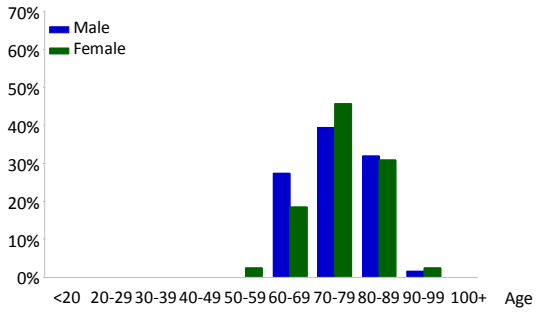


Table STR8: Type of Revision of Primary Total Reverse Shoulder

Type of Revision	Number	Percent
Cup/Head	42	28.6
Cup Only	40	27.2
Head Only	28	19.0
Humeral Component	16	10.9
Glenoid Component	10	6.8
Humeral/Glenoid	4	2.7
Removal of Prostheses	4	2.7
Cement Spacer	3	2.0
TOTAL	**147**	**100.0**

Table STR9: Reason for Revision of Known Primary Total Reverse Shoulder

Reason for Revision	Number	Percent
Instability/Dislocation	65	44.2
Loosening/Lysis	35	23.8
Infection	22	15.0
Fracture	13	8.8
Pain	3	2.0
Rotator Cuff Insufficiency	2	1.4
Malposition	2	1.4
Implant Breakage Glenoid	1	0.7
Incorrect Sizing	1	0.7
Other	3	2.0
TOTAL	**147**	**100.0**

PROSTHESES WITH HIGHER THAN ANTICIPATED RATES OF REVISION

Introduction

A unique and important function of registries is that they are able to provide population based data on the comparative outcome of individual prostheses in a community. Outcomes data are necessary to enable an evidence-based approach to prostheses selection. For many prostheses the only source of outcomes data are registry reports.

It is evident from registry data that most prostheses have comparable outcomes. A number however have revision rates that are statistically higher than other prostheses in the same class. The Registry identifies these as 'prostheses with a higher than anticipated rate of revision'.

The Registry has developed a standardised three-stage approach to identify prostheses that are outliers with respect to revision rate. The comparator group includes all other prostheses within the same class regardless of their rate of revision. This is a more pragmatic approach than comparing to a select group of prostheses with the lowest revision rates.

The first stage is a screening test to identify prostheses that differ significantly from the combined revisions per 100 observed component years of all other prostheses in the same class. It is an automated analysis that identifies prostheses based on set criteria. These include:

(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 significant ($p<0.05$), 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 two 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 Registry has the capacity to assess the outcome of individual prostheses or the combination of prostheses used in a procedure. It is apparent from previous reports that individual prostheses that perform well in one combination may not perform well in another. Therefore, the outcome of an individual prosthesis is partly dependent on the combination of the different prostheses used.

Consequently, the Registry undertakes two different analyses in Stage 1. The first assesses the outcome of all combinations. The second assesses all individual prostheses regardless of the combination. Both analyses are reviewed to determine if a higher revision rate is identified with a single combination, multiple combinations or uniformly with all combinations. If prostheses are identified in a single combination, that combination progresses to Stage 2. An individual prosthesis progresses to Stage 2 if it is identified in multiple combinations or uniformly across all combinations.

In Stage 2, the Director and Deputy Directors of the Registry in conjunction with DMAC staff, review the identified prostheses and undertake further investigation. This includes examining for the impact of confounders, and calculating age and gender adjusted hazard ratios. In addition, all prostheses identified in previous reports are re-analysed as part of the Stage 2 analysis. This is not dependent on re-identification in Stage 1. If there is a significant difference compared to the combined hazard rate of all other prostheses in the same class then the prosthesis or prostheses combination progress to Stage 3. The possible exception to this is the presence of confounding factors, such as use in complex primary procedures.

Stage 3 involves review by a panel of independent orthopaedic specialists from the Australian Orthopaedic Association Shoulder and Elbow Society.

Identified prostheses are listed in one of three groups. There are those that have a higher rate of revision but are no longer used in Australia. These are listed to provide ongoing information on the rate of revision. This also enables comparison of other prostheses to the discontinued group.

The second group is prostheses that are being re-identified but are still used. This listing identifies that the prosthesis continues to have a higher than anticipated rate of revision but it also provides information on its continued use. Most identified or re-identified prostheses decline in use. This is usually evident only after the first year because almost a full year of use has occurred prior to the identification in the Annual Report.

The third group, 'Newly Identified' lists prostheses that are being used and are identified for the first time.

The Registry does not make a recommendation or otherwise on the continued use of identified prostheses. Identification is made to ensure that prostheses with a higher rate of revision compared to others in the same class are highlighted.

On occasion, a prosthesis previously identified no longer meets the criteria for inclusion. In this situation, the prosthesis is not subsequently re-identified. Registries monitor the continual real time performance of prostheses within a community and the Annual Report provides a snap shot at a particular time. It is necessary to appreciate that outcomes are continually changing and that many factors may influence that change including identification in the report.

The current approach used by the Registry is most effective at identifying the relative performance of recently introduced prostheses. As the Registry's follow up period increases, it is becoming evident that prostheses with a delayed onset of higher rates of revision are not as readily identified by this approach. The Registry will develop further strategies in the future to identify these prostheses.

This year, five upper limb specialists together with the Chairman of the NJRR Committee, Director and Deputy Director of the Registry attended.

In the 2011 report, the Registry identified three shoulder prostheses, the SMR/SMR total conventional combination, the SMR/SMR total reverse combination and the Univers 3D/Univers 3D total conventional combination. The Univers 3D is no longer used. These three prostheses are re-identified as having a higher than anticipated rate of revision. Recently the L2 glenoid component of the SMR conventional total shoulder replacement has been withdrawn from the market.

The full analysis for all prostheses identified as having a higher than anticipated rate of revision in the 2012 Annual Report are available on the Registry website, www.dmac.adelaide.edu.au/aoanjrr/publications.jsp.

Primary Total Conventional Shoulder Replacement

There are no newly identified total conventional shoulder prostheses.

Table IP1: Revision Rate of Individual Total Conventional Shoulder identified as having a higher than anticipated Revision Rate

Humeral/Glenoid	N Total	Obs. Years	Revisions/100 Obs. Yrs	Hazard Ratio, P Value
Identified and no longer used				
Univers 3D/Univers 3D	34	128	3.90	Entire Period: HR=2.63 (1.08, 6.40),p=0.032
Re-Identified and still used				
SMR/SMR	1579	3134	4.08	Entire Period: HR=3.36 (2.55, 4.41),p<0.001

Note: All Components have been compared to all other Total Conventional Shoulder components.

Table IP2: Yearly Cumulative Percent Revision of Individual Total Conventional Shoulder identified as having a higher than anticipated Revision Rate

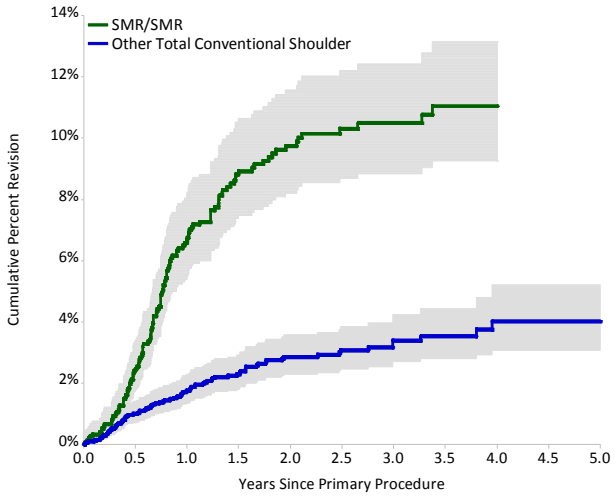
CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Identified and no longer used					
Univers 3D/Univers 3D	5.9 (1.5, 21.5)	14.7 (6.4, 31.8)	14.7 (6.4, 31.8)	14.7 (6.4, 31.8)	14.7 (6.4, 31.8)
Re-Identified and still used					
SMR/SMR	6.7 (5.5, 8.1)	9.8 (8.2, 11.6)	10.5 (8.8, 12.4)	11.0 (9.3, 13.2)	

Table IP3: Yearly Usage of Individual Total Conventional Shoulder identified as having a higher than anticipated Revision Rate

Year of Implant	2005	2006	2007	2008	2009	2010	2011
Identified and no longer used							
Univers 3D/Univers 3D	1	6	16	11			
Re-Identified and still used							
SMR/SMR		26	142	294	328	389	400

Figure IP1: Cumulative Percent Revision of Individual Total Conventional Shoulder re-identified and still used

Re-identified and still used



Primary Total Reverse Shoulder Replacement

There are no newly identified total reverse shoulder prostheses.

Table IP4: Revision Rate of Individual Total Reverse Shoulder identified as having a higher than anticipated Revision Rate

Humeral/Glenoid	N Total	Obs. Years	Revisions/100 Obs. Yrs	Hazard Ratio, P Value
Re-Identified and still used				
SMR/SMR	1540	2809	2.49	Entire Period: HR=1.49 (1.08, 2.07),p=0.015

Note: All Components have been compared to all other Total Reverse Shoulder components.

Table IP5: Yearly Cumulative Percent Revision of Individual Total Reverse Shoulder identified as having a higher than anticipated Revision Rate

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Re-Identified and still used					
SMR/SMR	3.8 (2.9, 5.0)	5.4 (4.3, 6.9)	5.9 (4.6, 7.5)	6.1 (4.8, 7.9)	

Table IP3: Yearly Usage of Individual Total Reverse Shoulder identified as having a higher than anticipated Revision Rate

Year of Implant	2005	2006	2007	2008	2009	2010	2011
Re-Identified and still used							
SMR/SMR	2	19	124	261	300	361	473

Figure IP2: Cumulative Percent Revision of Individual Total Reverse Shoulder re-identified and still used

Re-identified and still used