Australian Orthopaedic Association National Joint Replacement Registry

2025 SUPPLEMENTARY REPORT

Shoulder Replacement in Australia

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Shoulder Replacement in Australia

2025 Supplementary Report

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Introduction

The Australian Orthopaedic National Joint Replacement Registry (AOANJRR) presents the supplementary report *Shoulder Replacement in Australia* for the first time in 2025. This publication represents an important milestone, bringing together in one consolidated document the full scope of the Registry's shoulder replacement analyses from the following 2025 annual and supplementary reports:

- Main Annual Report:
  - 10, 15, 20 Year Chapter
  - Revision Arthroplasty Chapter
  - Shoulder Replacement Chapter
  - HTARR Chapter
- PROMs Supplementary report
- Mortality Supplementary Report
- Partial Shoulder Supplementary Report
- Comparative Prostheses Performance Supplementary Report
- Prosthesis Types with No or Minimal Use Supplementary Report

The purpose of this report is to enhance the accessibility of shoulder data in a streamlined and comprehensive format. Amalgamating these data sources provides the most complete account of shoulder arthroplasty outcomes available in Australia.

Categories of Shoulder Replacement

Shoulder replacement is grouped into three broad categories: primary partial, primary total, and revision shoulder replacement.

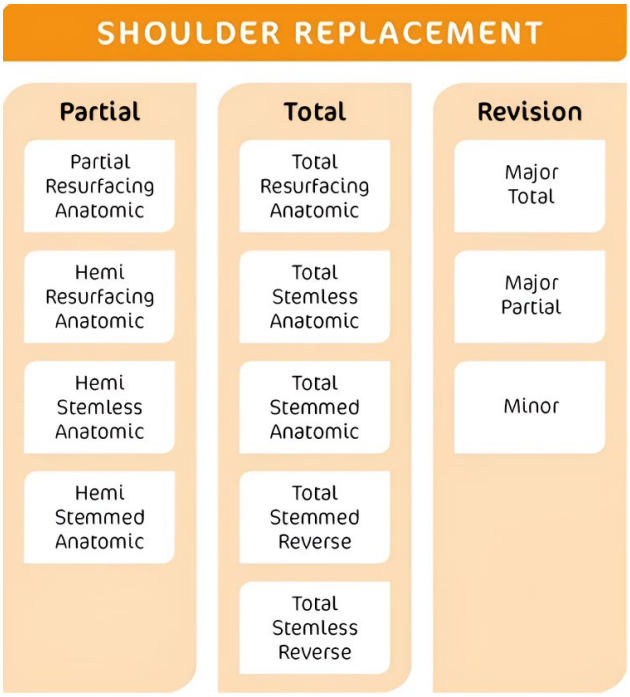
A primary replacement is an initial procedure undertaken on a joint and involves replacing either part (partial) or all (total) of the articular surface.

Primary partial and primary total shoulder replacements are further categorised into subclasses depending on the type of prosthesis used. Partial shoulder subclasses include partial resurfacing anatomic, hemi resurfacing anatomic, hemi stemless anatomic and hemi stemmed anatomic.

Primary total shoulder replacement is subcategorised into five classes. These are defined by the type of prosthesis used. The use of stemless anatomic shoulder replacement has been growing considerably. As such, mid head humeral prostheses are now classified as stemless anatomic and stemless reverse to reflect their differing polarity.

Total shoulder subclasses include total resurfacing anatomic, total stemless anatomic, total stemmed anatomic, total stemmed reverse and total stemless reverse. Definitions for each of these classes are detailed in the subsequent sections.

Revision shoulder replacements 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 subsequent operations of primary partial, primary total, or previous revision procedures. Shoulder revision procedures are categorised into three subclasses: major total, major partial and minor shoulder replacement.



Detailed demographic information on shoulder replacement is available in the supplementary report 'Demographics of Hip, Knee and Shoulder Arthroplasty' on the AOANJRR website: https://aoanjrr.sahmri.com/annual-reports-2025

Use of Shoulder Replacement

There are 107,581 shoulder replacements with a procedure date up to and including 31 December 2024. This is an additional 11,795 shoulder procedures since the last report.

For further information on the **closure of the database** please see the **Glossary** of this report.

Registry shoulder data collection commenced in 2004, and full national collection was implemented by November 2007.

The number of shoulder replacement procedures undertaken in 2024 increased by 730 (6.9%) compared to the previous year and has increased by 328.9% since 2008.

When considering all shoulder replacement procedures currently recorded by the Registry, primary total shoulder replacement is the most common, followed by primary partial and revision procedures (Table SSR1).

In 2024, the proportion of revision procedures has declined to 7.5%. This equates to 383 fewer revisions compared to the peak of 10.9% in 2012.

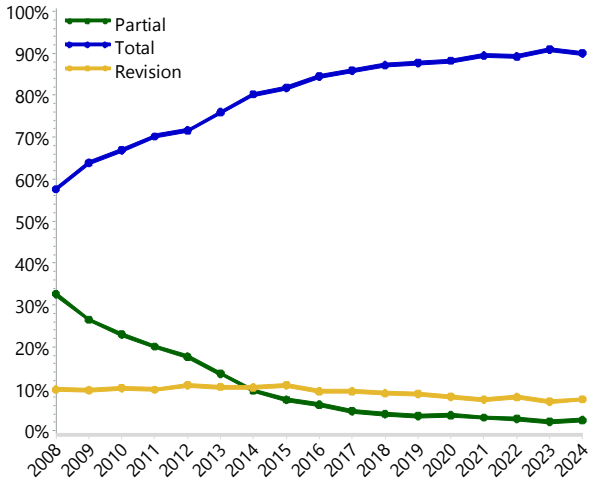
The proportion of total shoulder replacements has increased from 57.6% in 2008 to 90.0% in 2024.

Table SSR1 Number of Shoulder Replacements

Shoulder Category	Number	Percent
Partial	8404	7.8
Total	89719	83.4
Revision	9458	8.8
TOTAL	**107581**	**100.0**

Since 2008, there has been a proportional increase in the use of total shoulder replacement, a decline in the use of partial shoulder replacement and a decrease in the proportion of revision procedures (Figure SSR1).

Figure SSR1 Proportion of Shoulder Replacements



ASA and BMI in Shoulder Replacement

Data are reported on shoulder replacement procedures for both the American Society of Anesthesiologists Physical Status Classification (ASA score) and Body Mass Index (BMI). ASA score and BMI are both known to impact the outcome of shoulder replacement surgery. The Registry commenced collection of ASA score in 2012 and BMI data in 2015.

There are ASA score data on 86,095 and BMI data on 74,380 shoulder replacement procedures. Since its initial collection, ASA score has been recorded for 96.6% of procedures. BMI has been recorded for 92.8% of procedures since collection commenced.

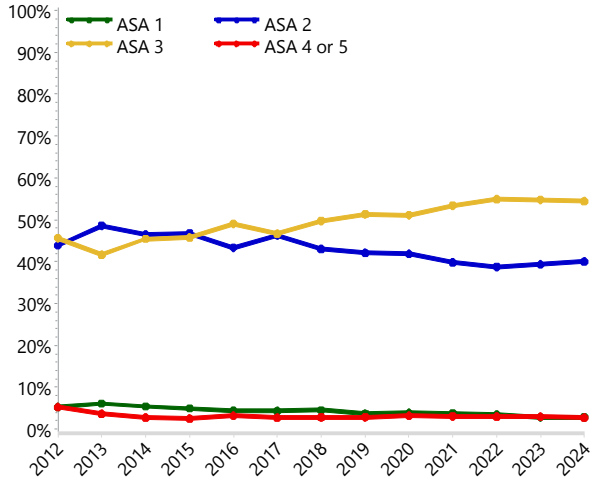
ASA SCORE

There are five ASA score classifications: [1]

1. A normal healthy patient
2. A patient with mild systemic disease
3. A patient with severe systemic disease
4. A patient with severe systemic disease that is a constant threat to life
5. A moribund patient who is not expected to survive without the operation

Whilst the proportions of normal and severely ill are not changing, ASA 3 is increasing with time (Figure SSR2).

Figure SSR2 Proportion of Shoulder Replacements by ASA Score



BMI CATEGORY

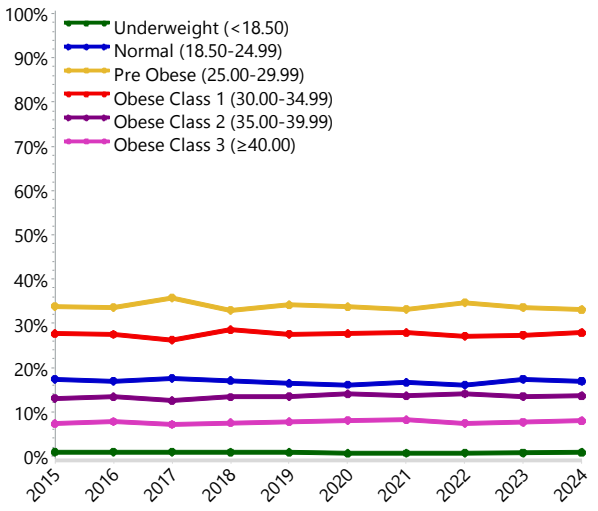
BMI for adults is classified into six main categories: [2]

Underweight	<18.5
Normal	18.5 – 24.9
Pre-obese	25.0 – 29.9
Obese Class 1	30.0 – 34.9
Obese Class 2	35.0 – 39.9
Obese Class 3	≥40.0

For all shoulder replacements, the majority of procedures, the proportions of BMI classes over time are not changing (Figure SSR3).

Additional ASA and BMI data can be found in the Primary Partial, Primary Total and Revision Shoulder Data Supplementary Report

Figure SSR3 Proportion of Shoulder Replacements by BMI Category



[1] https://www.asahq.org/standards-and-practice-parameters/statement-on-asa-physical-status-classification-system

[2] https://www.aihw.gov.au/reports/overweight-obesity/overweight-and-obesity/contents/measuring-overweight-and-obesity

CT Scan and Glenoid Morphology

Data are reported on shoulder replacement procedures for both CT scans and glenoid morphology. The Registry commenced collection of CT scan usage and glenoid morphology in January 2017.

CT SCANS

There is a difference depending on the class of shoulder replacement. Total shoulder replacement procedures have a higher proportion of CT scans compared to revision shoulder replacement and partial shoulder replacement. CT utilisation for shoulder replacement cases has risen from under 60% in 2017 to 84% in 2024 (Figure SSR4). In contrast, the relative percentages of glenoid morphology categories have not changed (Figure SSR5).

A CT scan was undertaken in 74.2% of all reported shoulder replacements.

GLENOID MORPHOLOGY

There are 5 glenoid morphology categories based on the Walch classification:[3]

A1. Humeral head centred – minor erosion

A2. Humeral head centred – major erosion

B1. Humeral head posteriorly subluxated narrowing of the posterior joint space, subchondral sclerosis and osteophytes

B2. Humeral head posteriorly subluxated – posterior rim erosion with a biconcave glenoid

C. Glenoid retroversion of more than 25 degrees, regardless of the erosion

The most common glenoid morphology category is A1 for all shoulder procedure categories. The second most common is A2 for total and revision shoulder replacement with A2 and B2 for partial shoulder replacement (Figure SSR5).

Additional CT scan and glenoid morphology data can be found in the Primary Partial, Primary Total and Revision Shoulder Data Supplementary Report

Figure SSR4 Proportion of Shoulder Replacements by CT Scan Usage

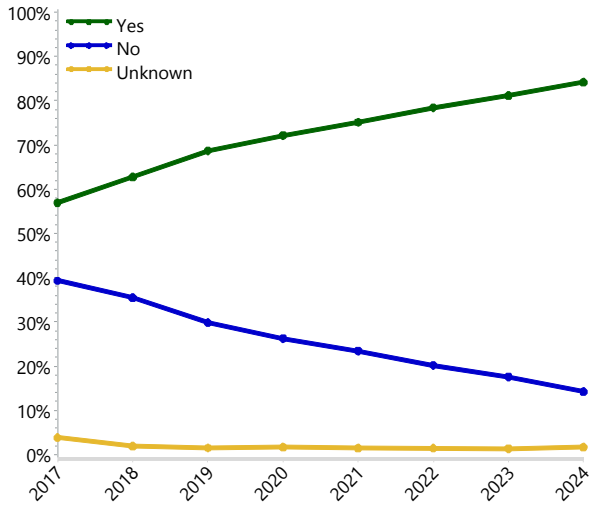
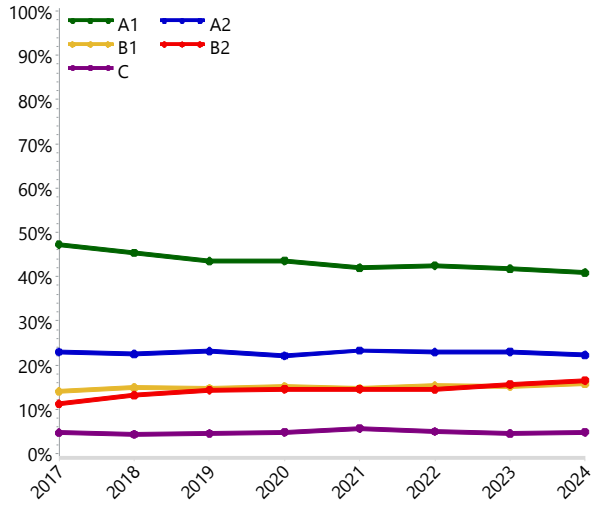


Figure SSR5 Proportion of Shoulder Replacements by Glenoid Morphology



[3] Walch G, Badet R, Boulahia A, Khoury A. Morphologic study of the glenoid in primary glenohumeral osteoarthritis. J Arthroplasty. 1999 Sep 1;14(6):756-60.

Demographics of Shoulder Replacement

The overall population-based incidence of primary total shoulder replacement has steadily increased from 7.1 per 100,000 in 2008 to 37.4 per 100,000 in 2024. The incidence by state and territory confirms similar increases across the country (Figure SSR6).

In 2024, primary total shoulder replacement is undertaken more commonly in private hospitals with (75.1%) which has remained consistent since 2008 (Figure SSR7). However, when assessed by volume of primary total shoulder replacement per hospital, the lowest 2 quartiles of hospitals represented 36.7% of cases in 2008 and reduced to 4.1% in 2024 (Figure SSR8).

The proportion of primary total shoulder replacements per surgeon has also changed, with the highest quartile of surgeon volume undertaking 52.2% of all cases in 2024, in comparison to 9.6% in 2008 (Figure SSR9).

As volumes of surgeons performing total primary shoulder replacement and numbers of procedures have increased over time, the experience (number of years since first reported shoulder replacement procedure) of orthopaedic surgeons performing most of the shoulder replacement has also grown. In 2024, 81% of primary total shoulder replacements are completed by orthopaedic surgeons with ≥8 years' experience (Figure SSR10).

Figure SSR6 **Incidence of Primary Total Shoulder Replacement per 100,000 from 2008 to 2024**

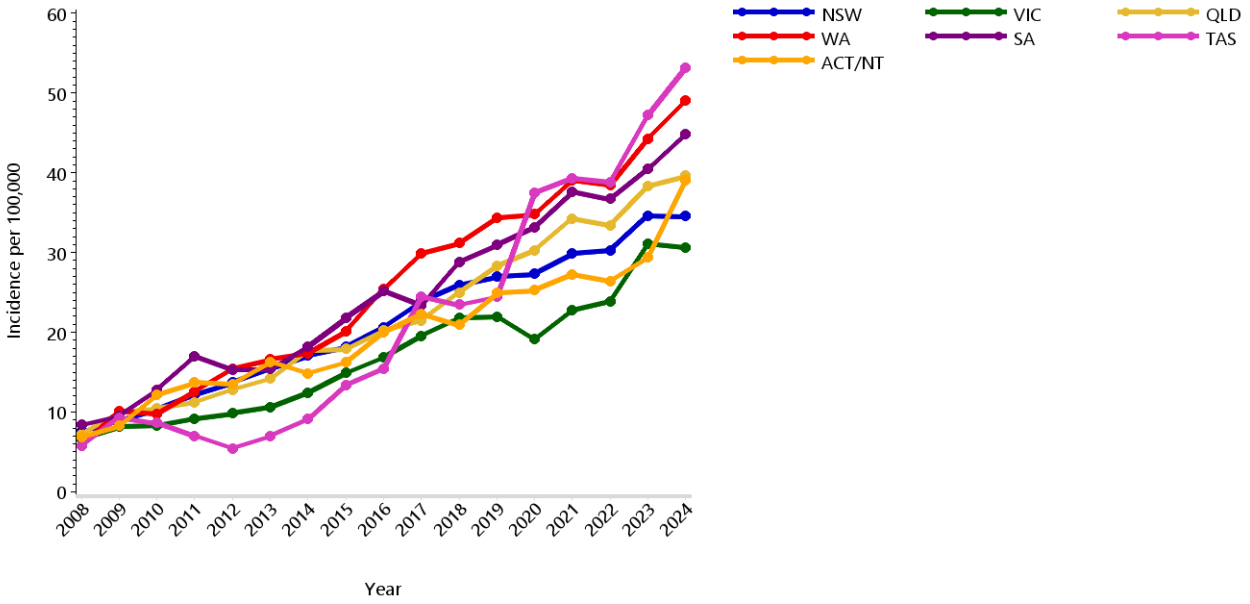


Figure SSR7 **Primary Total Shoulder Replacement by Hospital Setting**

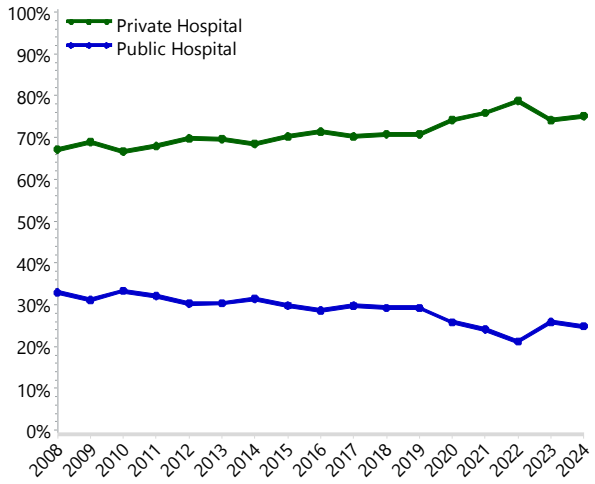


Figure SSR8 **Primary Total Shoulder Replacement by Hospital Volume**

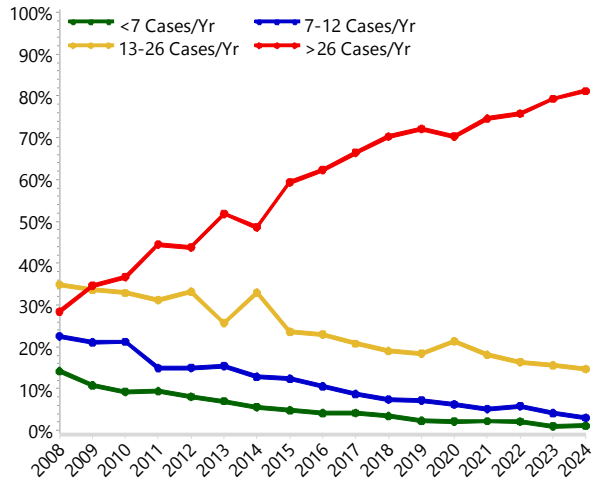


Figure SSR9 **Primary Total Shoulder Replacement by Surgeon Volume**

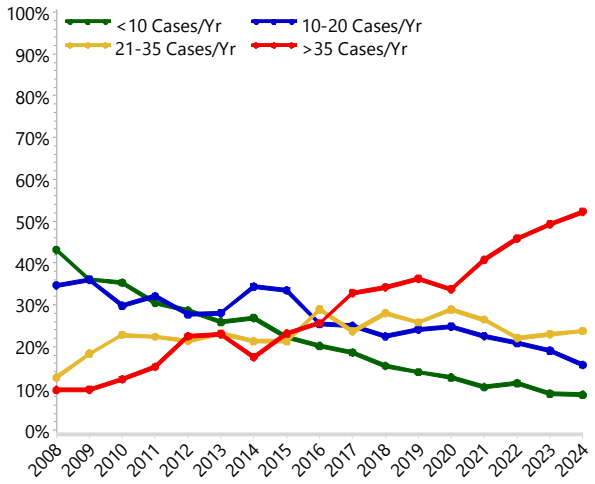
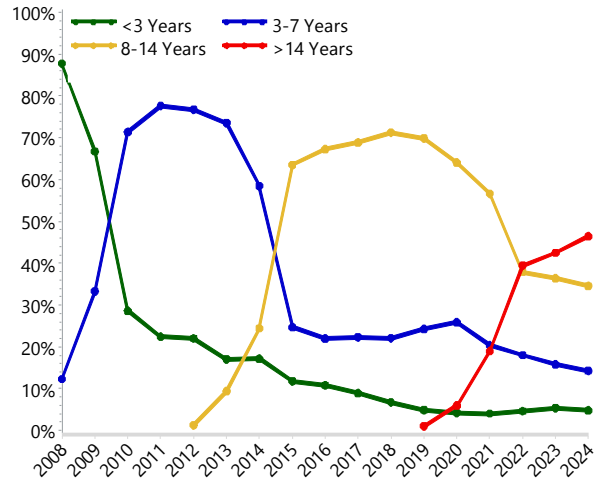


Figure SSR10 **Primary Total Shoulder Replacement by Surgeon Experience**

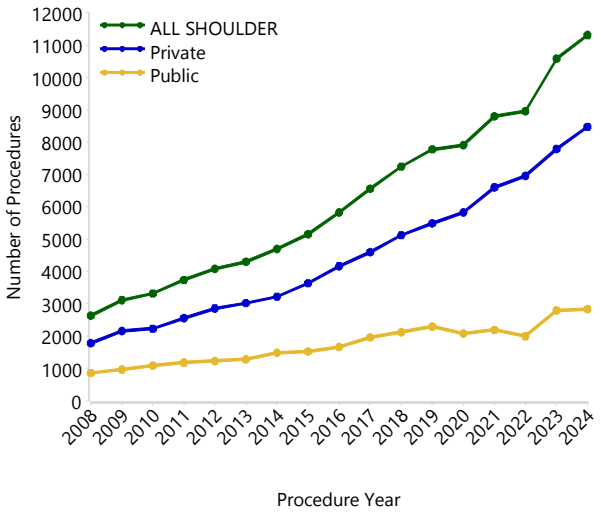


Public and Private Sector Shoulder Procedure Distribution

The national commencement of shoulder replacement reporting to the Registry was November 2007. In 2024, 74.9% of all shoulder replacement procedures reported to the Registry were undertaken in private hospitals (Figure SSR11).

In the last year, there was an increase in the number of shoulder replacements recorded in the private and the public sector. There were 8,470 private sector procedures (an increase of 8.9% compared to number of private sector procedures in 2023) and 2,836 public sector procedures (an increase of 1.5% in the number of public sector procedures since 2023).

Figure SSR11 Shoulder Replacement by Hospital Sector



Since 2008, shoulder replacement has increased by 376.6% in the private sector compared to 230.2% in the public sector.

There were 192 primary partial shoulder replacements reported for the private sector in 2024; an increase of 42.2% compared to 2023 and a decrease of 56.1% since 2008. In the public sector, there were 94 partial shoulder replacements; an increase of 4.4% compared to 2023 and a decrease of 77.7% since 2008.

In 2024, 7,668 primary total shoulder replacements were reported in the private sector, an increase of 7.1% compared to 2023. In the public sector in 2024, there were 2,506 primary total shoulder replacements, an increase of 2.2% compared to 2023. Since 2008, primary total shoulder replacement has increased by 562.2% in the private sector compared to 596.1% in the public sector.

There were 610 private sector revision shoulder replacements reported in 2024. This is an increase of 25.5% compared to 2023. In the public sector, there were 236 revision shoulder replacements, a decrease of 6.3% compared to 2023. Since 2008, revision shoulder replacement has increased by 235.2% in the private sector compared to 206.5% in the public sector.

Age and Gender Demographics of Shoulder Replacement

The usage of shoulder replacement has varied with age and gender since the first full year of reporting of 2018. Overall, there have been more females than males undergoing shoulder replacement (Table SSR2). This trend is reversed in partial resurfacing, hemi resurfacing and hemi stemless anatomic, partial shoulder replacements, and total resurfacing anatomic, and total stemless reverse shoulder replacements. Only in minor shoulder revisions do males predominate (Table SSR3). The percentage usage of partial, total and revision class shoulder replacements for females are characterised in Figures SSR12, SSR13 and SSR14).

The percentage of partial shoulder replacement trended up in females since 2018, but both total resurfacing anatomic and total stemless reverse procedures were not undertaken in females in 2024 (Figure SSR15 and Figure SSR16).

While the proportion of revision classes have not altered, the use of partial shoulder replacements have fallen over the reporting period except for hemi stemmed anatomic after 2016 (Figure SSR17 and Figure SSR18). Total stemmed anatomic procedures have fallen since 2015, coinciding with a similar but opposite rise in total stemless anatomic numbers. Total stemmed reverse predominates shoulder replacement in Australia (Figure SSR19). Procedure numbers of revision classes have risen reflecting the increased frequency of shoulder replacement (Figure SSR20).

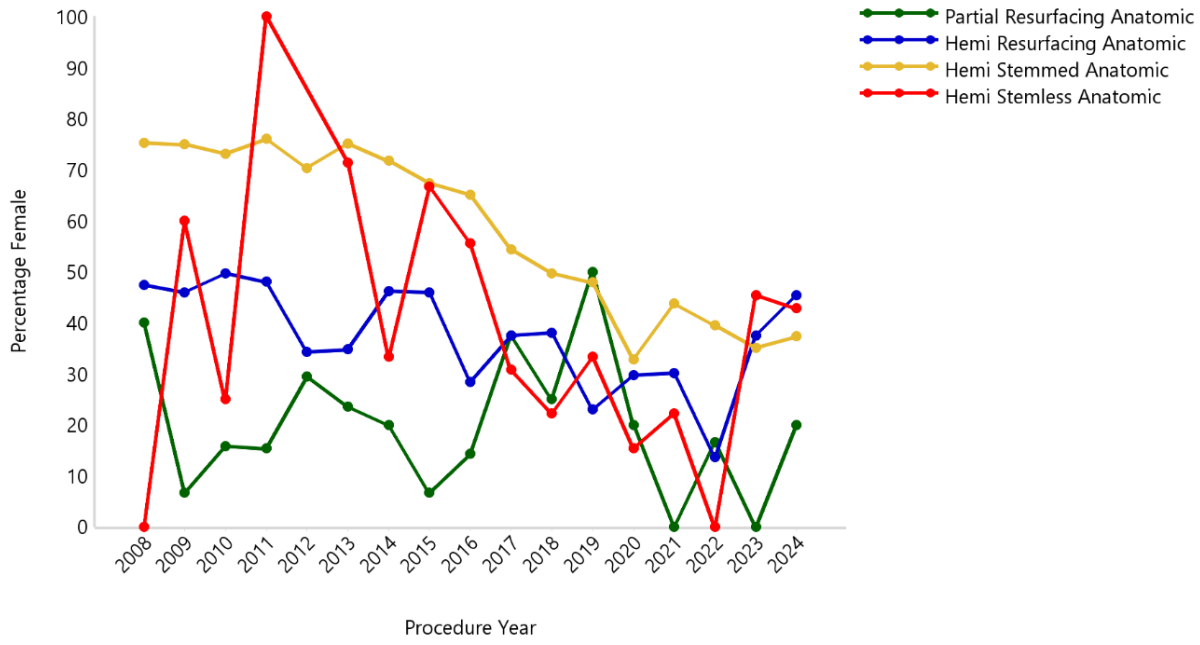
Table SSR2 All Shoulder Replacements by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	44194	41.1%	14	100	70	69.1	10.1
Female	63387	58.9%	12	103	74	73.0	8.8
TOTAL	**107581**	**100.0%**	**12**	**103**	**72**	**71.4**	**9.6**

Table SSR3 Number of Shoulder Replacements by Gender

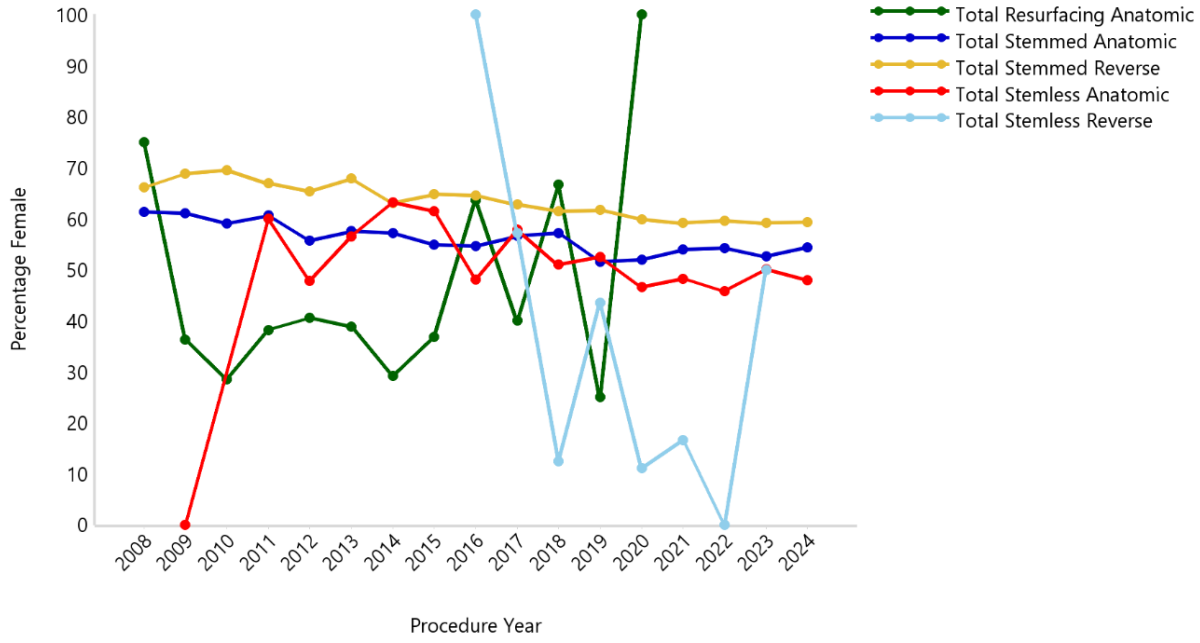
Shoulder Replacement	Female		Male		TOTAL	
	N	%	N	%	N	%
Partial Resurfacing Anatomic	51	21.3	188	78.7	239	2.8
Hemi Resurfacing Anatomic	753	39.9	1132	60.1	1885	22.4
Hemi Stemmed Anatomic	4031	65.5	2127	34.5	6158	73.3
Hemi Stemless Anatomic	43	35.2	79	64.8	122	1.5
All Primary Partial	**4878**	**58.0**	**3526**	**42.0**	**8404**	**100.0**
Total Resurfacing Anatomic	95	40.4	140	59.6	235	0.3
Total Stemmed Anatomic	9609	56.9	7284	43.1	16893	18.8
Total Stemmed Reverse	40943	61.5	25664	38.5	66607	74.2
Total Stemless Anatomic	2961	50.1	2955	49.9	5916	6.6
Total Stemless Reverse	21	30.9	47	69.1	68	0.1
All Primary Total	**53629**	**59.8**	**36090**	**40.2**	**89719**	**100.0**
Major Total	1897	55.3	1535	44.7	3432	36.3
Major Partial	1999	50.5	1962	49.5	3961	41.9
Minor	984	47.7	1081	52.3	2065	21.8
All Revision	**4880**	**51.6**	**4578**	**48.4**	**9458**	**100.0**
ALL SHOULDERS	**63387**	**58.9**	**44194**	**41.1**	**107581**	**100.0**

Figure SSR12 Percentage of Females by Type of Partial Shoulder Replacement and Procedure Year



Note: There were no hemi stemless anatomic procedures recorded in 2012

Figure SSR13 Percentage of Females by Type of Total Shoulder Replacement and Procedure Year



Note: There were no total stemless anatomic procedures recorded in 2008 and 2010
There were no total resurfacing anatomic procedures recorded in 2021 and 2023

Figure SSR14 Percentage of Females by Revision Shoulder Replacement and Procedure Year

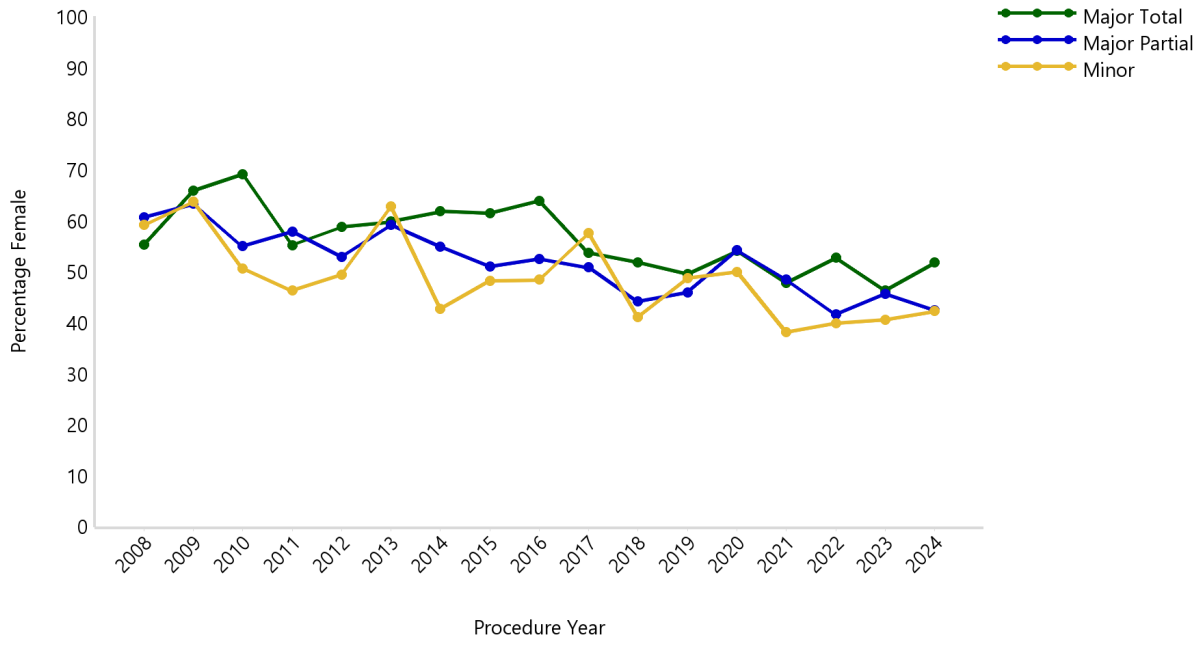
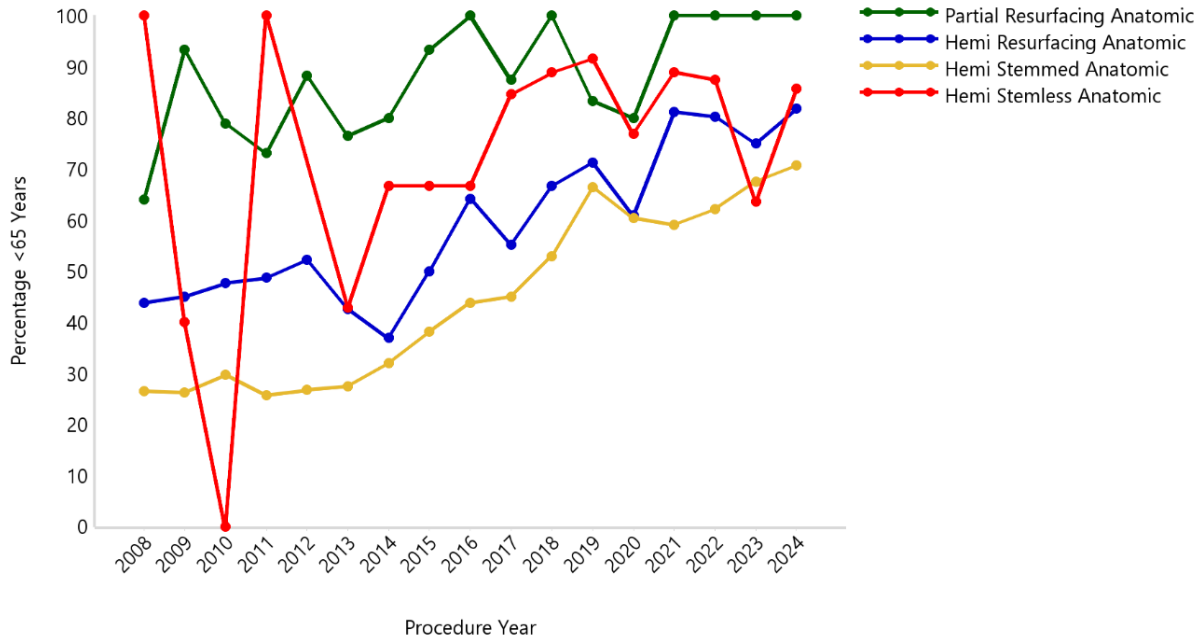
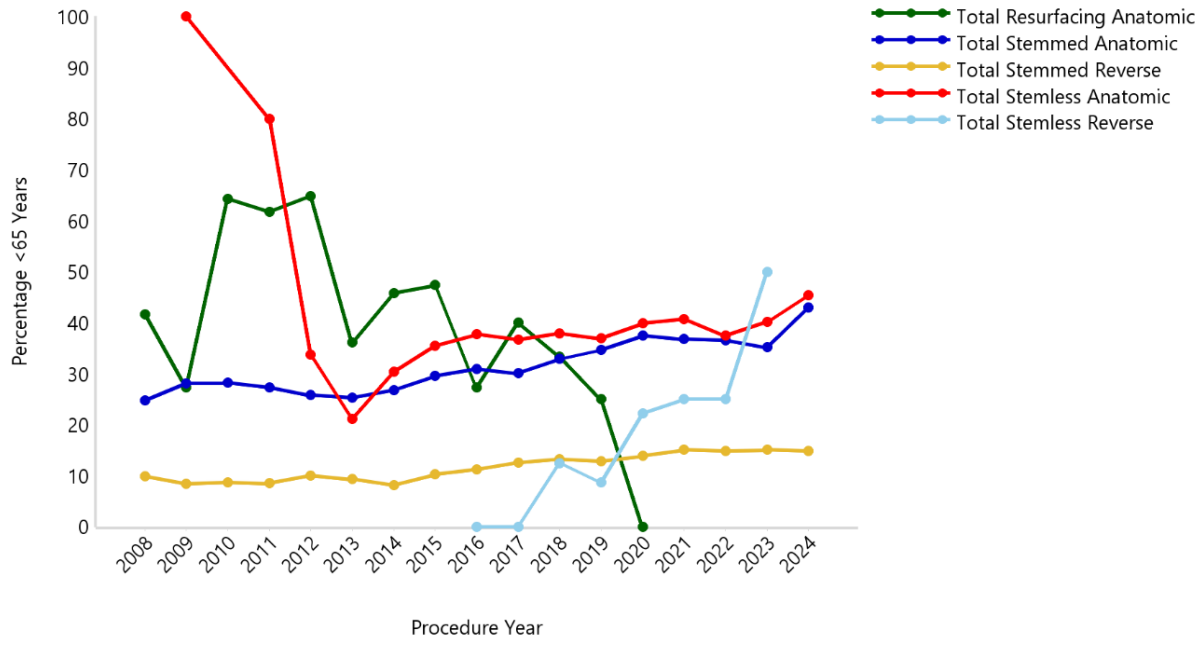


Figure SSR15 Percentage of Patients Aged <65 Years by Type of Partial Shoulder Replacement and Procedure Year



Note: There were no hemi stemless anatomic procedures recorded in 2012

Figure SSR16 Percentage of Patients Aged <65 Years by Type of Total Shoulder Replacement and Procedure Year



Note: There were no total stemless anatomic procedures recorded in 2008
There were no total resurfacing anatomic procedures recorded between 2021 and 2024

Figure SSR17 Percentage of Patients Aged <65 Years by Revision Shoulder Replacement and Procedure Year

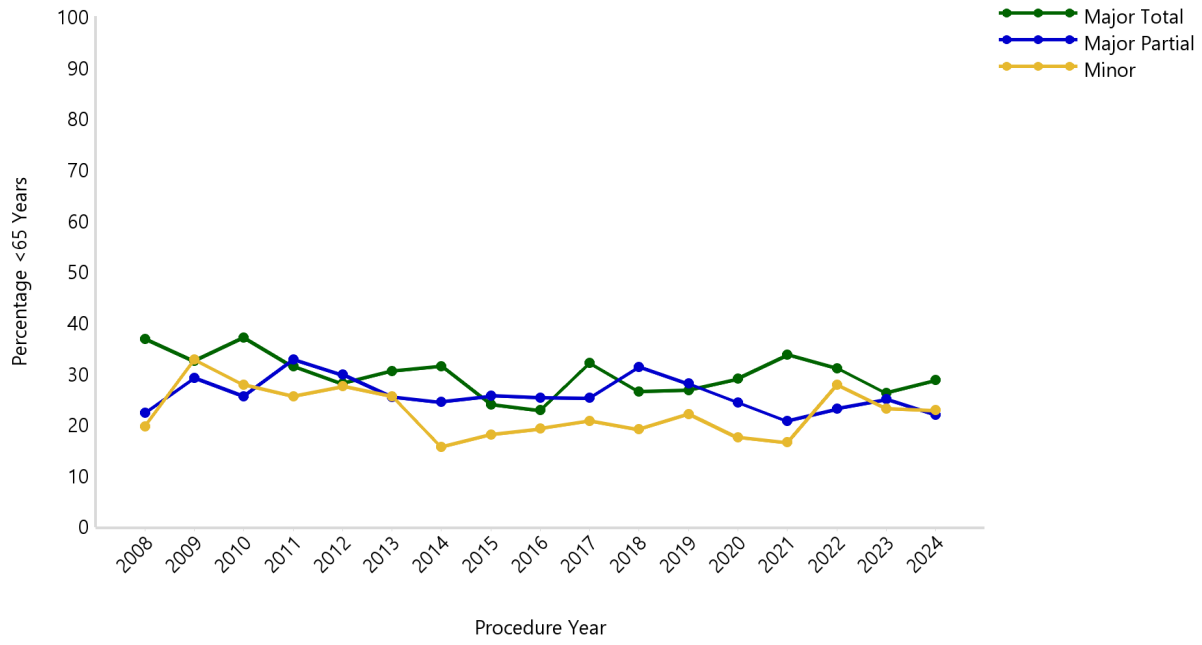


Figure SSR18 Trends in Usage of Partial Shoulder Replacement by Procedure Year

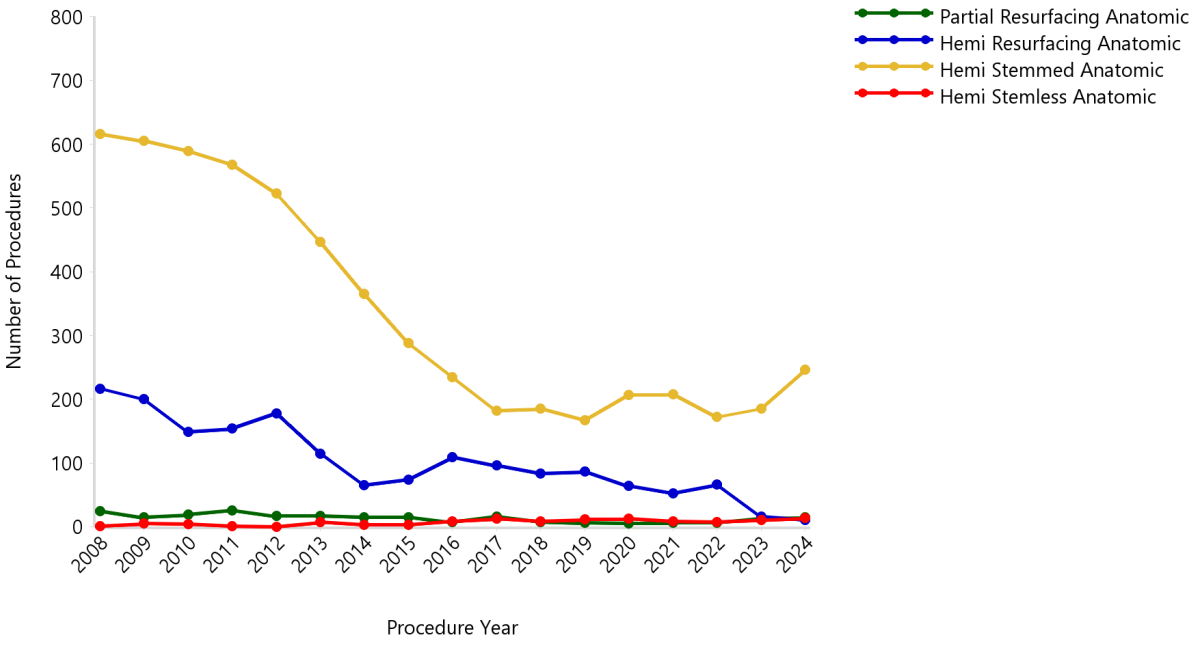


Figure SSR19 Trends in Usage of Total Shoulder Replacement by Procedure Year

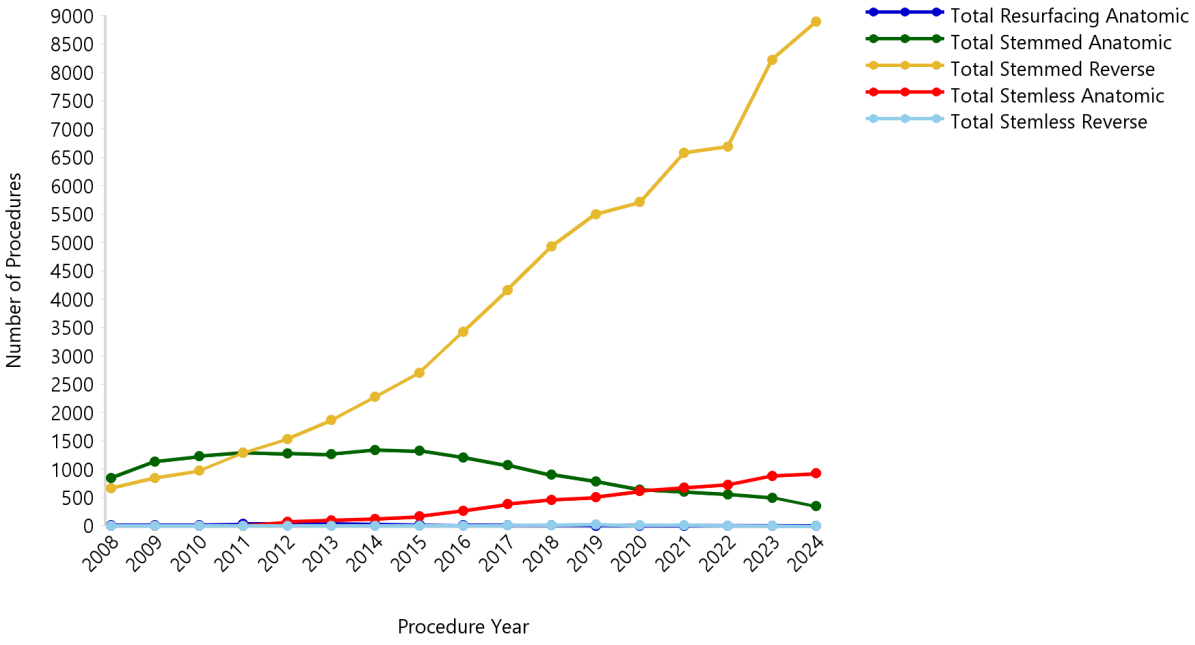
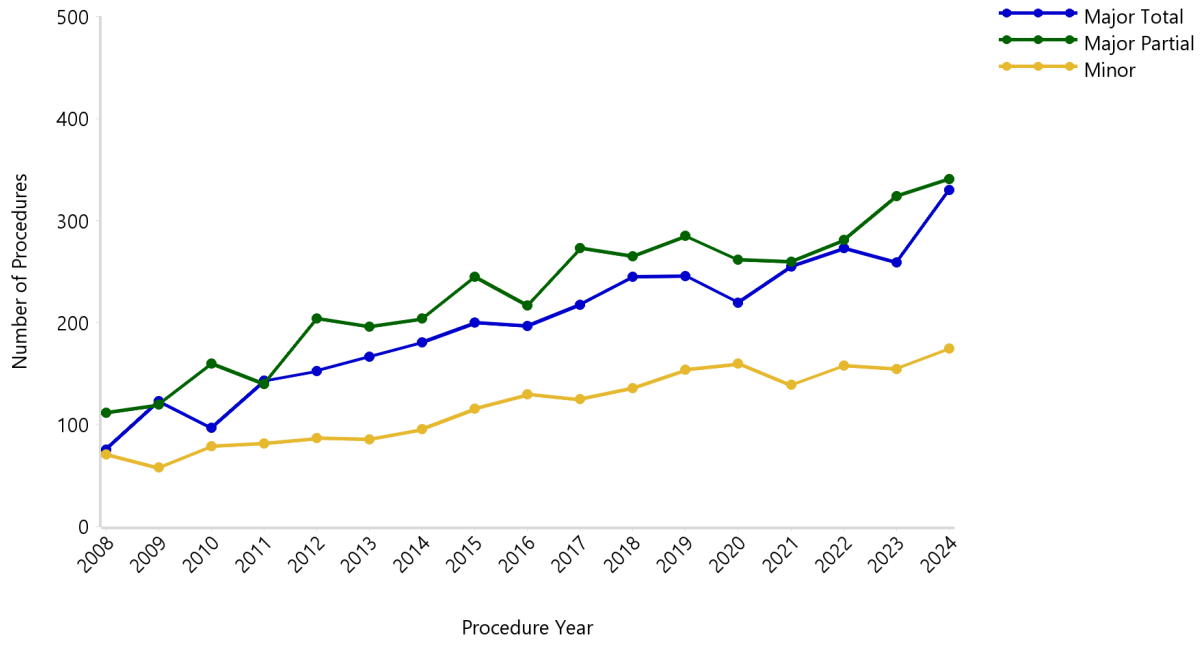


Figure SSR20 Trends in Usage of Revision Shoulder Replacement by Procedure Year



Incidence of Shoulder Replacement

The incidence of shoulder replacement has risen in Australia since 2008. This is predominately because of an increase in total shoulder replacement. This is reflected in all age groups and the Australian States and Territories.

Tables SSR4 through SSR8 and Figures SSR21 to SSR26 illustrate these trends.

There are very few reported bilateral simultaneous shoulder replacements, most are sequential, with the second procedure occurring a minimum of 6 months after the first. (Table SSR9). First and subsequent revisions of shoulder replacement occur infrequently with 94.3% of patients with one shoulder replacement and 88.7% of those with bilateral shoulder replacements have not been revised. (Table SSR10)

Table SSR4 Incidence of Shoulder Replacement per 100,000 from 2008 to 2024

Shoulder Replacement	2008	2009	2010	2011	2012	2013	2014	2015	2016
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Hemi Resurfacing Anatomic	1.0	0.9	0.7	0.7	0.8	0.5	0.3	0.3	0.5
Hemi Stemmed Anatomic	2.9	2.8	2.7	2.5	2.3	1.9	1.6	1.2	1.0
Hemi Stemless Anatomic	0.0	0.0	0.0	0.0	.	0.0	0.0	0.0	0.0
All Primary Partial	**4.0**	**3.8**	**3.5**	**3.4**	**3.2**	**2.5**	**1.9**	**1.6**	**1.5**
Total Resurfacing Anatomic	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.0
Total Stemmed Anatomic	4.0	5.2	5.6	5.8	5.6	5.5	5.7	5.6	5.0
Total Stemmed Reverse	3.1	3.9	4.4	5.8	6.7	8.1	9.7	11.3	14.2
Total Stemless Anatomic	.	0.0	.	0.0	0.3	0.4	0.5	0.7	1.1
Total Stemless Reverse	.	.	.	.	.	.	.	.	0.0
All Primary Total	**7.1**	**9.2**	**10.1**	**11.7**	**12.9**	**14.1**	**16.0**	**17.7**	**20.3**
All Revisions	**1.2**	**1.4**	**1.5**	**1.6**	**2.0**	**1.9**	**2.0**	**2.4**	**2.2**
ALL SHOULDERS	**12.4**	**14.4**	**15.1**	**16.7**	**18.0**	**18.6**	**20.0**	**21.6**	**24.1**

Shoulder Replacement	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Hemi Resurfacing Anatomic	0.4	0.3	0.3	0.2	0.2	0.3	0.1	0.0	0.3
Hemi Stemmed Anatomic	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.9	1.1
Hemi Stemless Anatomic	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
All Primary Partial	**1.2**	**1.1**	**1.1**	**1.1**	**1.1**	**1.0**	**0.8**	**1.1**	**1.5**
Total Resurfacing Anatomic	0.0	0.0	0.0	0.0	.	.	.	.	0.0
Total Stemmed Anatomic	4.3	3.6	3.1	2.5	2.3	2.2	1.9	1.3	3.2
Total Stemmed Reverse	16.9	19.7	21.7	22.2	25.6	25.7	30.9	32.7	12.9
Total Stemless Anatomic	1.6	1.8	2.0	2.4	2.6	2.8	3.3	3.4	1.2
Total Stemless Reverse	0.0	0.0	0.1	0.0	0.0	0.0	0.0	.	0.0
All Primary Total	**22.9**	**25.2**	**26.9**	**27.1**	**30.5**	**30.7**	**36.1**	**37.4**	**17.3**
All Revisions	**2.5**	**2.6**	**2.7**	**2.5**	**2.5**	**2.7**	**2.8**	**3.1**	**1.8**
ALL SHOULDERS	**26.6**	**29.0**	**30.7**	**30.8**	**34.2**	**34.4**	**39.7**	**41.6**	**20.7**

Figure SSR21 Incidence of Shoulder Replacement per 100,000 from 2008 to 2024

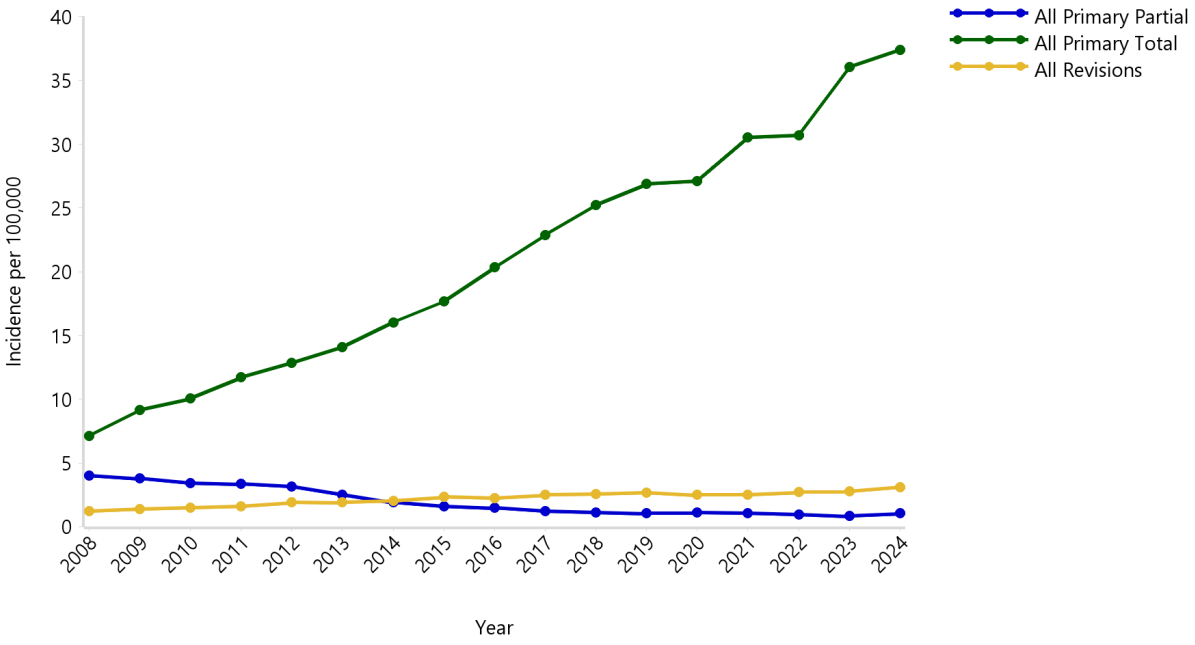


Table SSR5 Incidence of Shoulder Replacement in Patients Aged <55 Years per 100,000 from 2008 to 2024

Shoulder Replacement	2008	2009	2010	2011	2012	2013	2014	2015	2016
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Hemi Resurfacing Anatomic	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.1	0.2
Hemi Stemmed Anatomic	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3
Hemi Stemless Anatomic	0.0	.	.	.	.	0.0	0.0	0.0	0.0
All Primary Partial	**0.6**	**0.6**	**0.6**	**0.6**	**0.5**	**0.4**	**0.4**	**0.4**	**0.5**
Total Resurfacing Anatomic	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Stemmed Anatomic	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.5
Total Stemmed Reverse	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.3	0.2
Total Stemless Anatomic	.	0.0	.	.	0.0	0.0	0.0	0.1	0.1
Total Stemless Reverse	.	.	.	.	.	.	.	.	.
All Primary Total	**0.3**	**0.4**	**0.5**	**0.6**	**0.6**	**0.5**	**0.5**	**0.8**	**0.8**
All Revisions	**0.1**	**0.1**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
ALL SHOULDERS	**1.0**	**1.2**	**1.2**	**1.4**	**1.4**	**1.1**	**1.1**	**1.4**	**1.5**

Shoulder Replacement	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Hemi Resurfacing Anatomic	0.2	0.2	0.2	0.1	0.1	0.2	0.0	0.0	0.1
Hemi Stemmed Anatomic	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.5	0.2
Hemi Stemless Anatomic	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
All Primary Partial	**0.5**	**0.5**	**0.6**	**0.6**	**0.5**	**0.5**	**0.5**	**0.7**	**0.4**
Total Resurfacing Anatomic	.	0.0	.	.	.	.	.	.	0.0
Total Stemmed Anatomic	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3
Total Stemmed Reverse	0.4	0.4	0.5	0.6	0.7	0.7	0.9	0.9	0.3
Total Stemless Anatomic	0.2	0.2	0.2	0.4	0.4	0.5	0.5	0.6	0.2
Total Stemless Reverse	.	.	.	.	.	.	0.0	.	0.0
All Primary Total	**0.9**	**1.0**	**1.1**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**0.7**
All Revisions	**0.3**	**0.2**	**0.3**	**0.2**	**0.2**	**0.3**	**0.3**	**0.3**	**0.2**
ALL SHOULDERS	**1.7**	**1.8**	**1.9**	**2.0**	**2.1**	**2.2**	**2.5**	**2.7**	**1.3**

Figure SSR22 Incidence of Shoulder Replacement in Patients Aged <55 Years per 100,000 from 2008 to 2024

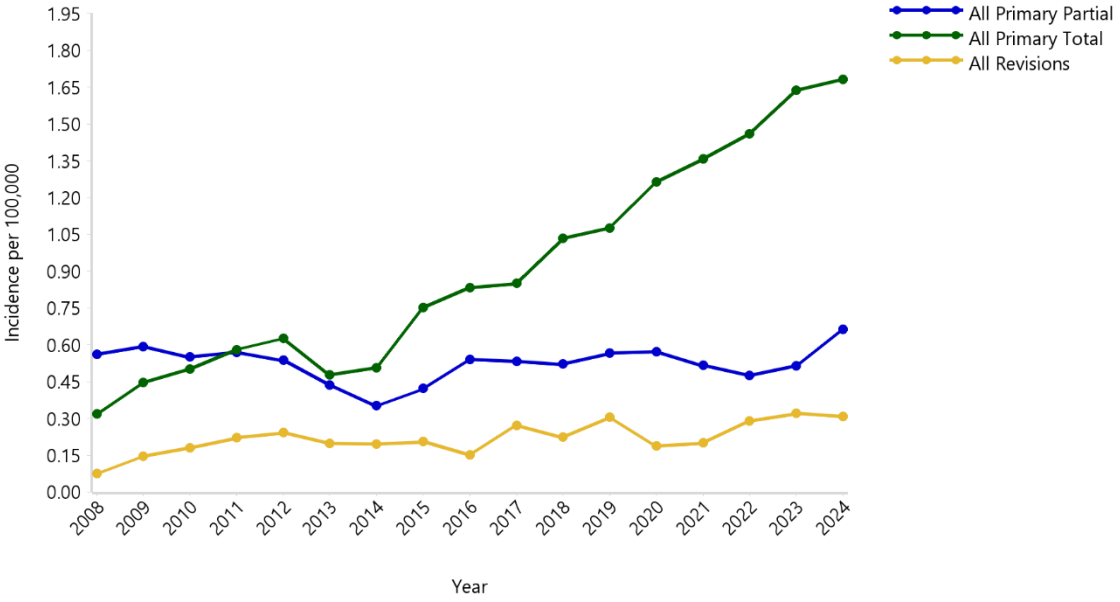


Table SSR6 Incidence of Shoulder Replacement in Patients Aged 55-64 Years per 100,000 from 2008 to 2024

Shoulder Replacement	2008	2009	2010	2011	2012	2013	2014	2015	2016
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	.
Hemi Resurfacing Anatomic	2.4	2.3	1.7	1.6	2.3	1.1	0.6	0.7	1.1
Hemi Stemmed Anatomic	5.2	4.4	5.0	4.0	3.7	3.2	2.8	2.5	2.0
Hemi Stemless Anatomic	.	0.1	.	0.0	.	.	0.0	0.0	0.1
All Primary Partial	**7.8**	**6.9**	**6.8**	**5.7**	**6.1**	**4.3**	**3.5**	**3.3**	**3.2**
Total Resurfacing Anatomic	0.2	.	0.2	0.5	0.8	0.4	0.3	0.3	0.1
Total Stemmed Anatomic	7.1	10.6	11.2	11.1	10.1	10.4	11.2	11.9	10.5
Total Stemmed Reverse	2.3	2.5	3.0	3.6	4.9	5.6	6.1	8.5	12.3
Total Stemless Anatomic	.	.	.	0.2	0.7	0.6	1.3	1.5	2.8
Total Stemless Reverse	.	.	.	.	.	.	.	.	.
All Primary Total	**9.6**	**13.2**	**14.3**	**15.3**	**16.5**	**16.9**	**18.9**	**22.2**	**25.7**
All Revisions	**2.3**	**2.9**	**2.8**	**2.9**	**3.4**	**3.4**	**3.3**	**3.5**	**3.5**
ALL SHOULDERS	**19.7**	**22.9**	**23.9**	**23.9**	**25.9**	**24.6**	**25.7**	**29.0**	**32.5**

Shoulder Replacement	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	.	.	.	.	0.0	0.0	0.0	0.1	0.0
Hemi Resurfacing Anatomic	0.8	0.7	0.8	0.5	0.8	0.8	0.2	0.2	0.9
Hemi Stemmed Anatomic	1.3	1.8	2.0	1.9	2.0	1.9	1.6	2.3	2.2
Hemi Stemless Anatomic	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0
All Primary Partial	**2.3**	**2.6**	**2.9**	**2.4**	**2.8**	**2.8**	**1.9**	**2.6**	**3.1**
Total Resurfacing Anatomic	0.1	0.0	0.0	.	.	.	.	.	0.1
Total Stemmed Anatomic	9.4	7.9	7.2	6.1	5.7	5.4	4.3	3.8	6.8
Total Stemmed Reverse	16.2	19.9	21.0	22.9	29.1	28.7	35.5	37.6	13.1
Total Stemless Anatomic	3.7	4.7	4.9	5.8	6.5	5.8	8.4	9.9	2.9
Total Stemless Reverse	.	0.0	0.1	0.1	0.1	0.0	.	.	0.0
All Primary Total	**29.5**	**32.6**	**33.2**	**35.0**	**41.4**	**39.9**	**48.3**	**51.3**	**23.0**
All Revisions	**4.1**	**4.6**	**4.2**	**4.0**	**4.2**	**4.6**	**4.1**	**4.9**	**3.0**
ALL SHOULDERS	**35.9**	**39.8**	**40.3**	**41.4**	**48.4**	**47.3**	**54.3**	**58.8**	**29.1**

Figure SSR23 Incidence of Shoulder Replacement in Patients Aged 55-64 Years per 100,000 from 2008 to 2024

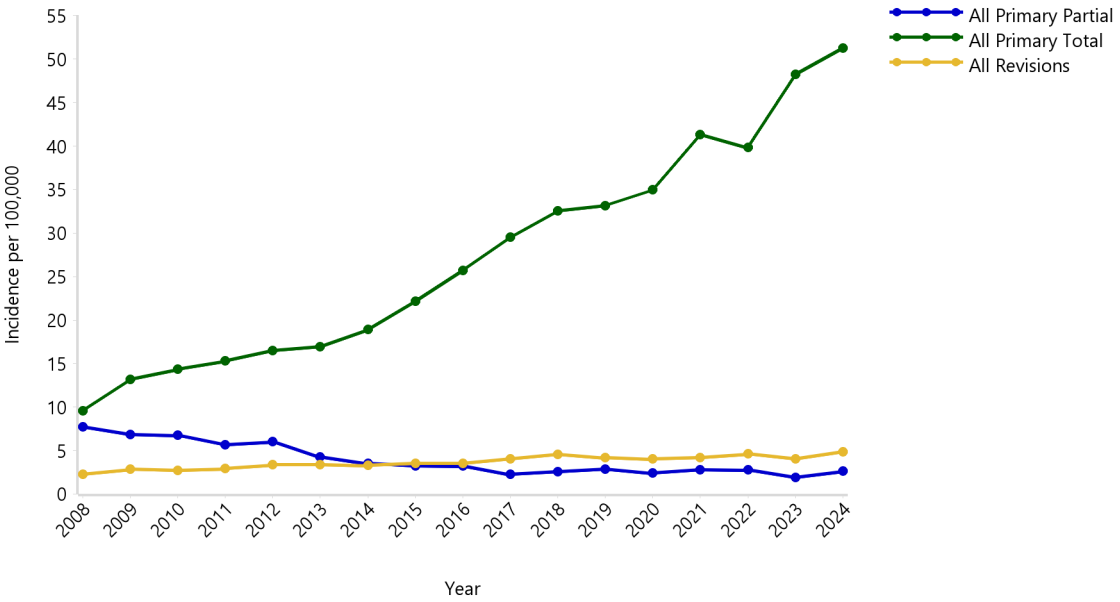


Table SSR7 Incidence of Shoulder Replacement in Patients Aged 65-74 Years per 100,000 from 2008 to 2024

Shoulder Replacement	2008	2009	2010	2011	2012	2013	2014	2015	2016
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.3	.	0.2	0.2	0.1	0.2	0.2	0.0	.
Hemi Resurfacing Anatomic	3.6	3.9	2.9	3.2	3.0	2.4	1.2	1.0	1.4
Hemi Stemmed Anatomic	11.6	11.3	9.8	10.5	9.5	8.1	6.3	4.6	3.0
Hemi Stemless Anatomic	.	0.1	0.1	.	.	0.2	0.1	.	0.1
All Primary Partial	**15.5**	**15.3**	**13.0**	**13.9**	**12.6**	**10.9**	**7.7**	**5.7**	**4.6**
Total Resurfacing Anatomic	0.4	0.4	0.3	0.6	0.7	1.0	0.6	0.5	0.4
Total Stemmed Anatomic	24.4	29.9	30.9	32.1	31.3	33.1	32.3	29.6	26.7
Total Stemmed Reverse	13.7	17.3	18.0	25.4	30.7	34.9	43.5	50.8	68.7
Total Stemless Anatomic	.	.	.	0.1	2.0	2.4	2.8	4.0	5.5
Total Stemless Reverse	.	.	.	.	.	.	.	.	0.0
All Primary Total	**38.5**	**47.6**	**49.3**	**58.2**	**64.6**	**71.4**	**79.2**	**84.9**	**101.3**
All Revisions	**6.1**	**6.3**	**7.0**	**8.4**	**9.4**	**8.7**	**9.4**	**10.9**	**11.4**
ALL SHOULDERS	**60.1**	**69.3**	**69.2**	**80.4**	**86.6**	**91.0**	**96.3**	**101.5**	**117.4**

Shoulder Replacement	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.1	.	0.0	0.0	.	.	.	.	0.1
Hemi Resurfacing Anatomic	1.3	0.9	0.9	0.9	0.4	0.5	0.2	0.1	1.2
Hemi Stemmed Anatomic	2.2	1.7	0.9	2.2	2.1	1.5	1.4	1.6	3.8
Hemi Stemless Anatomic	0.1	0.0	0.0	0.1	.	0.0	0.0	.	0.0
All Primary Partial	**3.8**	**2.6**	**1.8**	**3.3**	**2.5**	**2.0**	**1.6**	**1.7**	**5.1**
Total Resurfacing Anatomic	0.3	0.2	0.1	0.0	.	.	.	.	0.2
Total Stemmed Anatomic	23.9	18.8	16.0	11.8	10.8	9.2	8.5	5.2	17.3
Total Stemmed Reverse	78.4	87.1	96.1	100.7	111.2	111.1	131.1	140.9	62.5
Total Stemless Anatomic	7.9	9.0	9.8	11.7	11.1	13.3	14.7	13.7	6.0
Total Stemless Reverse	0.1	0.2	0.8	0.3	0.3	0.1	0.0	.	0.1
All Primary Total	**110.6**	**115.4**	**122.7**	**124.5**	**133.5**	**133.8**	**154.3**	**159.8**	**86.1**
All Revisions	**11.4**	**12.2**	**12.2**	**10.5**	**10.4**	**11.4**	**10.9**	**12.2**	**8.5**
ALL SHOULDERS	**125.8**	**130.2**	**136.7**	**138.4**	**146.4**	**147.1**	**166.8**	**173.7**	**99.7**

Figure SSR24 Incidence of Shoulder Replacement in Patients Aged 65-74 Years per 100,000 from 2008 to 2024

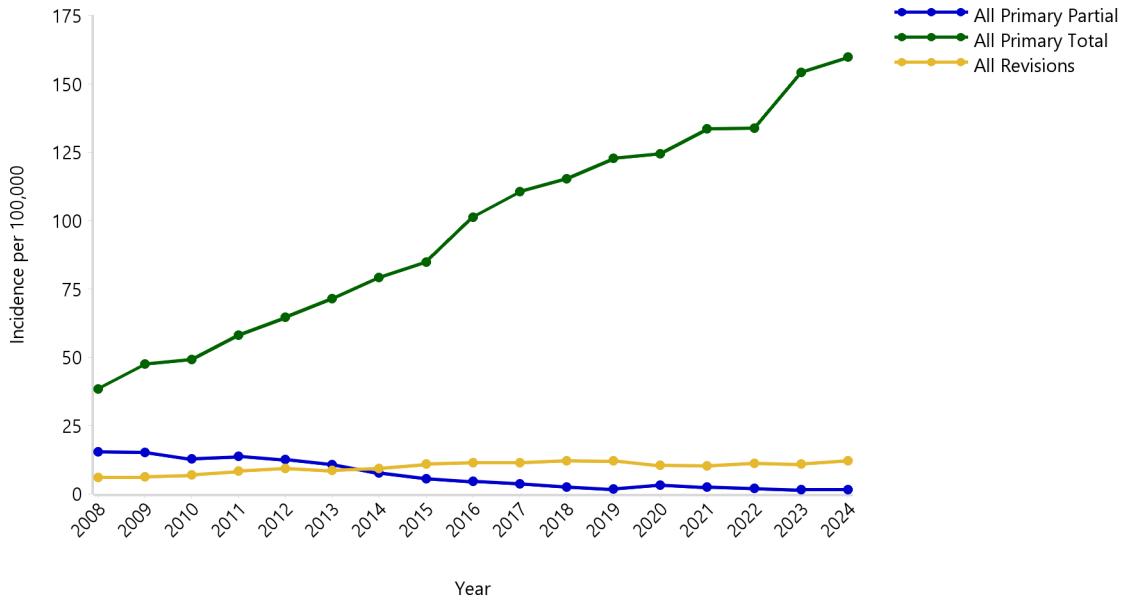


Table SSR8 Incidence of Shoulder Replacement in Patients Aged ≥75 Years per 100,000 from 2008 to 2024

Shoulder Replacement	2008	2009	2010	2011	2012	2013	2014	2015	2016
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	0.4	0.1	0.1	0.3	0.1	0.1	.	.	.
Hemi Resurfacing Anatomic	5.2	3.6	2.3	1.8	2.2	1.4	1.2	1.0	0.6
Hemi Stemmed Anatomic	21.2	20.2	18.6	17.5	15.0	11.8	8.4	5.6	4.3
Hemi Stemless Anatomic	.	0.1	0.1	.	.	0.1	.	0.1	.
All Primary Partial	**26.8**	**24.0**	**21.2**	**19.6**	**17.2**	**13.3**	**9.6**	**6.7**	**4.9**
Total Resurfacing Anatomic	0.1	0.1	.	0.2	0.1	0.3	0.1	.	.
Total Stemmed Anatomic	20.8	26.5	28.2	28.6	27.5	22.2	23.7	21.8	17.6
Total Stemmed Reverse	29.5	37.3	43.3	53.1	58.0	70.8	82.7	90.8	101.4
Total Stemless Anatomic	.	.	.	.	0.8	2.2	2.2	1.9	3.4
Total Stemless Reverse	.	.	.	.	.	.	.	.	.
All Primary Total	**50.4**	**63.9**	**71.5**	**81.9**	**86.3**	**95.5**	**108.7**	**114.5**	**122.4**
All Revisions	**7.7**	**8.1**	**9.0**	**8.0**	**10.4**	**11.2**	**11.7**	**13.6**	**11.4**
ALL SHOULDERS	**84.9**	**96.0**	**101.7**	**109.5**	**113.9**	**120.0**	**130.0**	**134.7**	**138.7**

Shoulder Replacement	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
	N	N	N	N	N	N	N	N	N
Partial Resurfacing Anatomic	.	.	.	.	.	.	.	.	0.0
Hemi Resurfacing Anatomic	0.9	0.5	0.3	0.2	.	0.1	.	.	0.9
Hemi Stemmed Anatomic	3.2	2.9	2.1	1.6	1.8	1.5	1.3	1.4	5.9
Hemi Stemless Anatomic	.	.	.	.	0.1	.	0.1	0.1	0.0
All Primary Partial	**4.0**	**3.4**	**2.3**	**1.7**	**1.8**	**1.5**	**1.4**	**1.5**	**6.8**
Total Resurfacing Anatomic	.	0.1	0.1	.	.	.	.	.	0.0
Total Stemmed Anatomic	14.3	10.9	8.3	6.6	6.1	6.5	5.4	3.1	12.3
Total Stemmed Reverse	119.0	138.4	148.0	138.4	151.6	149.8	179.3	184.4	91.7
Total Stemless Anatomic	4.5	5.1	5.6	5.0	6.7	6.4	7.9	7.4	3.2
Total Stemless Reverse	0.2	0.1	0.2	.	0.1	.	0.0	.	0.0
All Primary Total	**138.0**	**154.6**	**162.1**	**150.1**	**164.4**	**162.7**	**192.7**	**194.9**	**107.3**
All Revisions	**12.5**	**11.8**	**12.9**	**13.0**	**12.5**	**12.1**	**13.5**	**15.1**	**9.6**
ALL SHOULDERS	**154.5**	**169.9**	**177.3**	**164.8**	**178.8**	**176.3**	**207.6**	**211.6**	**123.7**

Figure SSR25 Incidence of Shoulder Replacement in Patients Aged ≥75 Years per 100,000 from 2008 to 2024

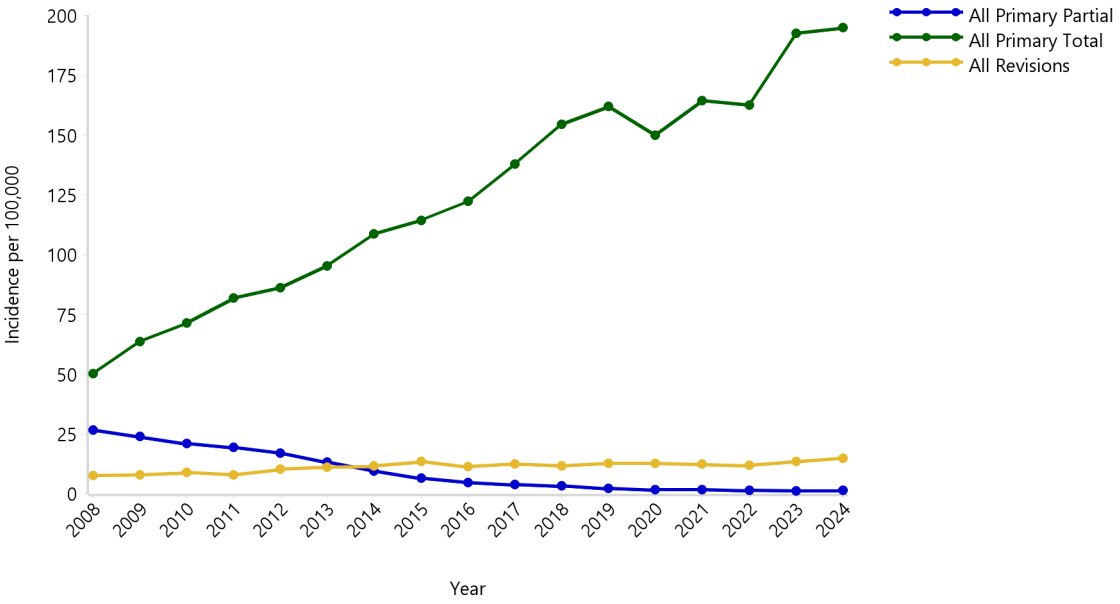
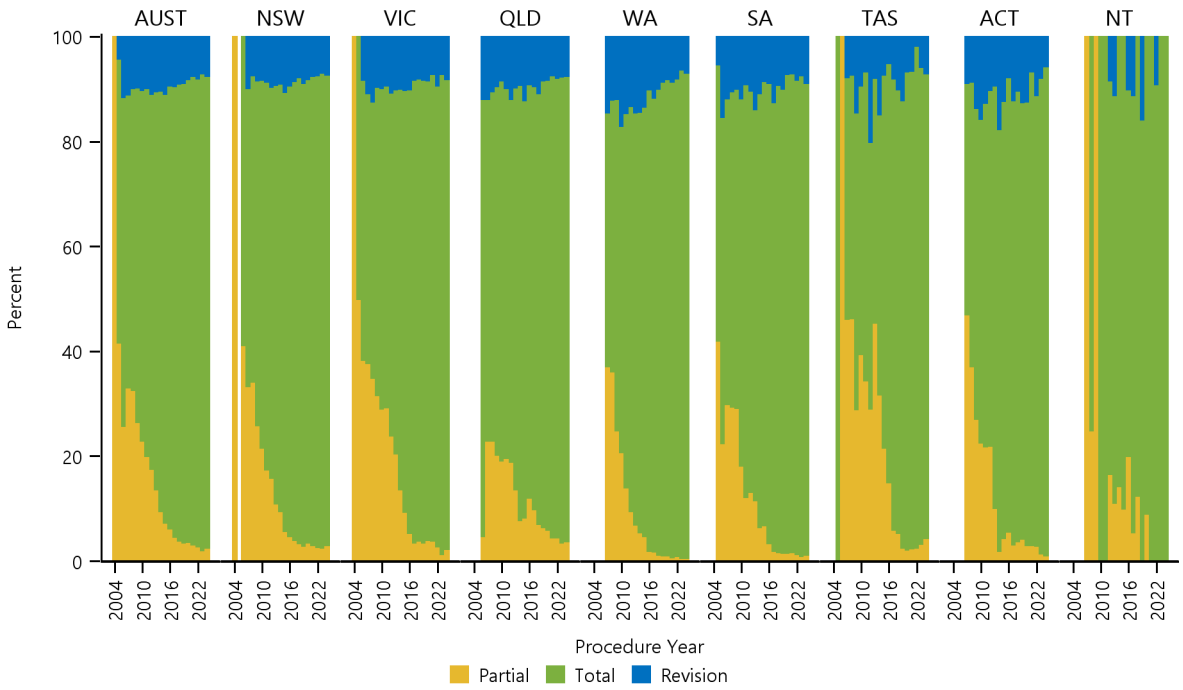


Figure SSR26 Trends in Usage of Shoulder Replacement by State/Territory and Year



Note: There were no shoulder replacements undertaken in 2005 in NSW

Note: There were no shoulder replacements undertaken in 2005 in NSW

Table SSR9 Time between Procedures for Bilateral Primary Shoulder Replacement

Bilateral Procedures	Same Day			1 day - 3 months			3 months - 6 months			≥6 months			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Both Partial	17	4.7	48.6	24	6.6	9.2	43	11.8	4.2	281	77.0	2.5	365	100.0	2.9
Both Total	18	0.2	51.4	232	2.0	88.9	962	8.3	93.8	10356	89.5	92.6	11568	100.0	92.5
Total/Partial	.	.	.	5	0.9	1.9	21	3.6	2.0	550	95.5	4.9	576	100.0	4.6
TOTAL	**35**	**0.3**	**100.0**	**261**	**2.1**	**100.0**	**1026**	**8.2**	**100.0**	**11187**	**89.4**	**100.0**	**12509**	**100.0**	**100.0**

Table SSR10 Number of Shoulder Procedures by Patient

Shoulder Procedures	Not Revised		1 Revision		2 Revisions		3 or more Revisions		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Unknown Primary/Primaries	.	.	1014	76.8	205	15.5	102	7.7	1321	100.0
Single Primary Procedure	68918	94.3	3220	4.4	658	0.9	311	0.4	73107	100.0
2 Primary Procedures	11091	88.7	1032	8.3	273	2.2	113	0.9	12509	100.0
TOTAL	**80009**	**92.0**	**5266**	**6.1**	**1136**	**1.3**	**526**	**0.6**	**86937**	**100.0**

Classes of Shoulder Replacement Demographics

Primary Partial Shoulder Replacement

In primary partial shoulder replacement females predominate, in an older age spectrum and most commonly for osteoarthritis.

Table SSR11 Primary Partial Shoulder Replacement by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	4878	58.0%	13	101	72	70.5	12.1
Male	3526	42.0%	14	94	61	59.5	14.5
TOTAL	**8404**	**100.0%**	**13**	**101**	**67**	**65.9**	**14.2**

Figure SSR27 Primary Partial Shoulder Replacement by Age and Gender

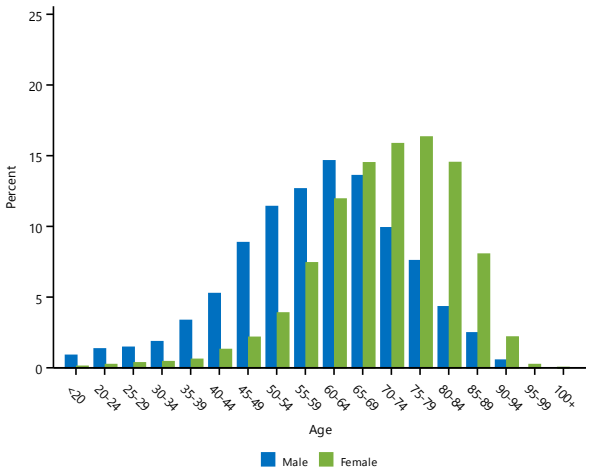
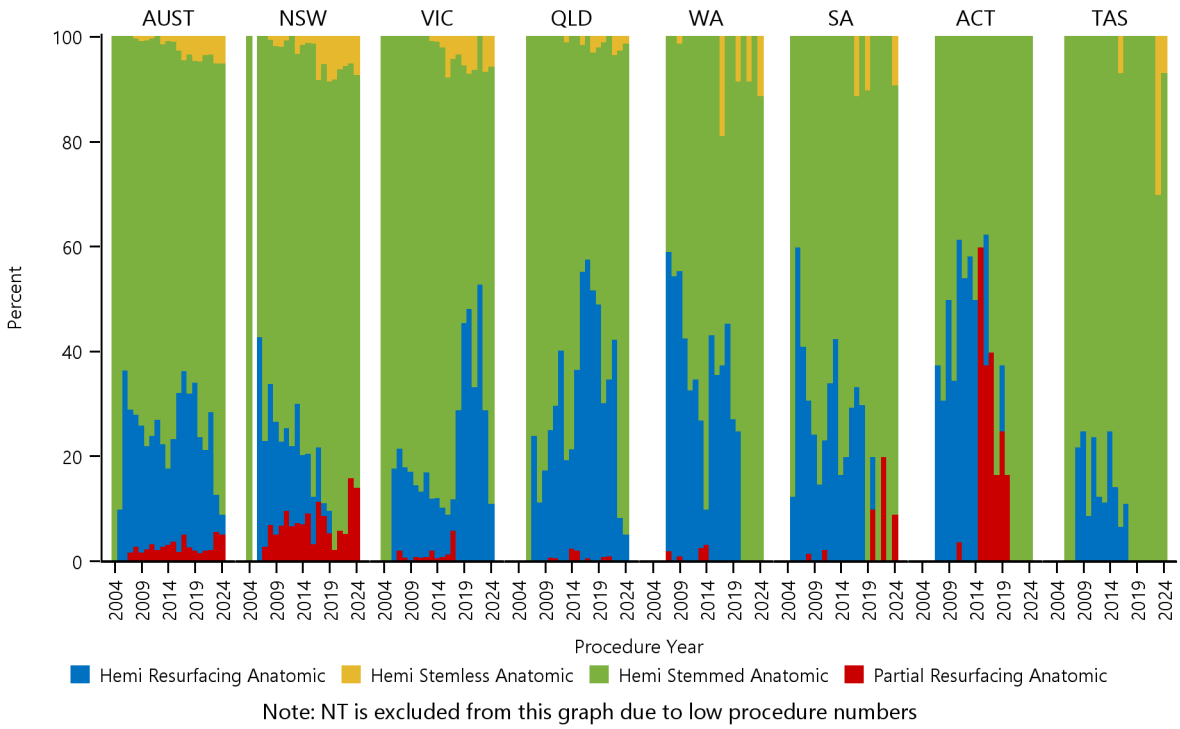


Table SSR12 Primary Partial Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	3806	45.3
Fracture	3251	38.7
Rotator Cuff Arthropathy	366	4.4
Osteonecrosis	321	3.8
Instability	266	3.2
Tumour	210	2.5
Rheumatoid Arthritis	135	1.6
Other Inflammatory Arthritis	43	0.5
Osteochondritis Dissecans	2	0.0
Other	4	0.0
TOTAL	**8404**	**100.0**

Figure SSR28 Trends in Usage of Partial Shoulder Replacement by State/Territory and Year



Note: NT is excluded from this graph due to low procedure numbers

Primary Total Shoulder Replacement

Amongst primary total shoulder replacement 40.2% were undertaken in males, and predominately for osteoarthritis.

Table SSR13 Primary Total Shoulder Replacement by Age and Gender

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	53629	59.8%	12	103	74	73.4	8.3
Male	36090	40.2%	14	100	71	70.1	9.0
TOTAL	**89719**	**100.0%**	**12**	**103**	**73**	**72.1**	**8.7**

Figure SSR29 Primary Total Shoulder Replacement by Age and Gender

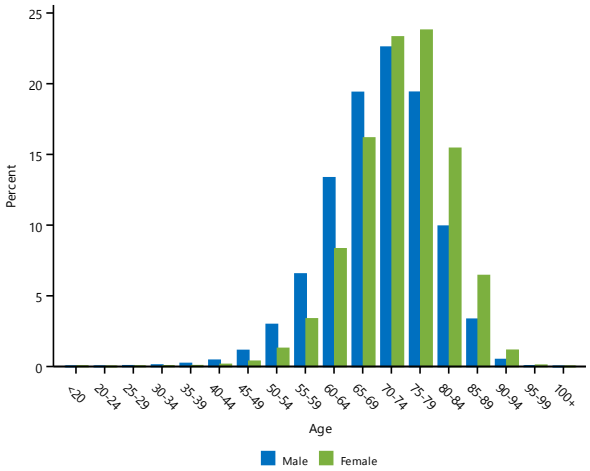
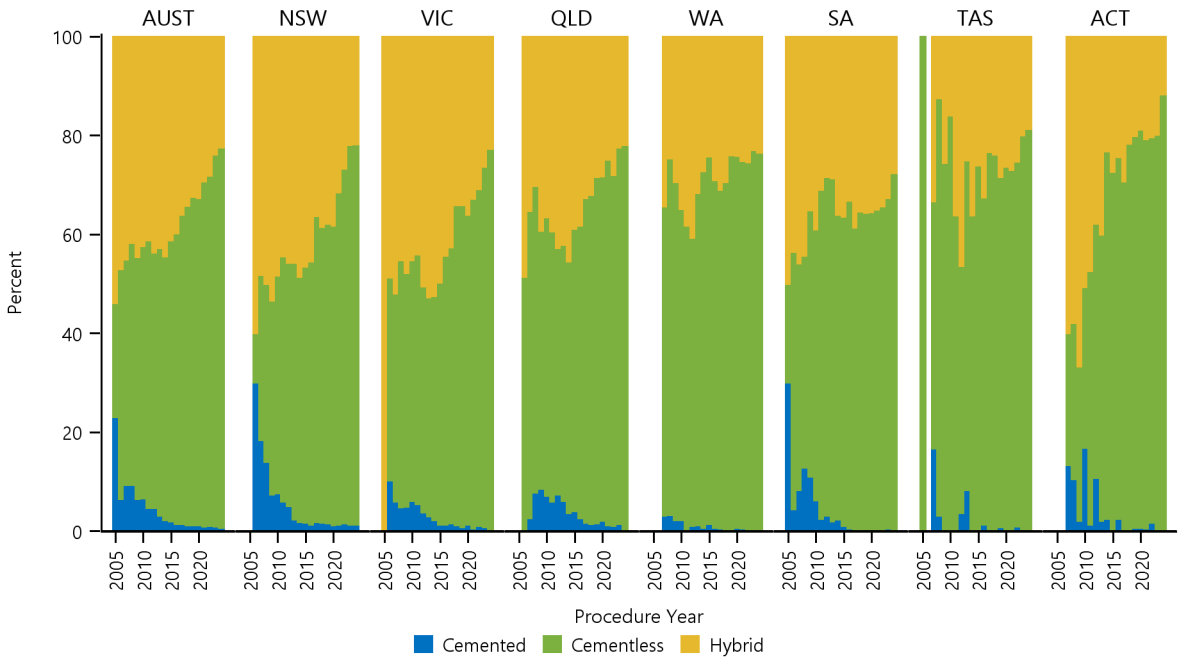


Table SSR14 Primary Total Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	50679	56.5
Rotator Cuff Arthropathy	24923	27.8
Fracture	10055	11.2
Rheumatoid Arthritis	1393	1.6
Osteonecrosis	1139	1.3
Instability	738	0.8
Other Inflammatory Arthritis	470	0.5
Tumour	302	0.3
Other	20	0.0
TOTAL	**89719**	**100.0**

Figure SSR30 Trends in Fixation of Primary Total Shoulder Replacement by State/Territory and Year



Note: There were no primary total shoulder replacements undertaken in 2006 in TAS
NT is excluded from this graph due to low procedure numbers

Revision Shoulder Replacement

There has been a greater proportion of revision shoulder replacements in females, most commonly for instability/dislocation and humeral/glenoid revisions undertaken.

Table SSR15 Age and Gender of All Revision Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	4578	48.4%	19	96	70	68.5	10.3
Female	4880	51.6%	15	98	73	71.4	10.1
TOTAL	**9458**	**100.0%**	**15**	**98**	**71**	**70.0**	**10.3**

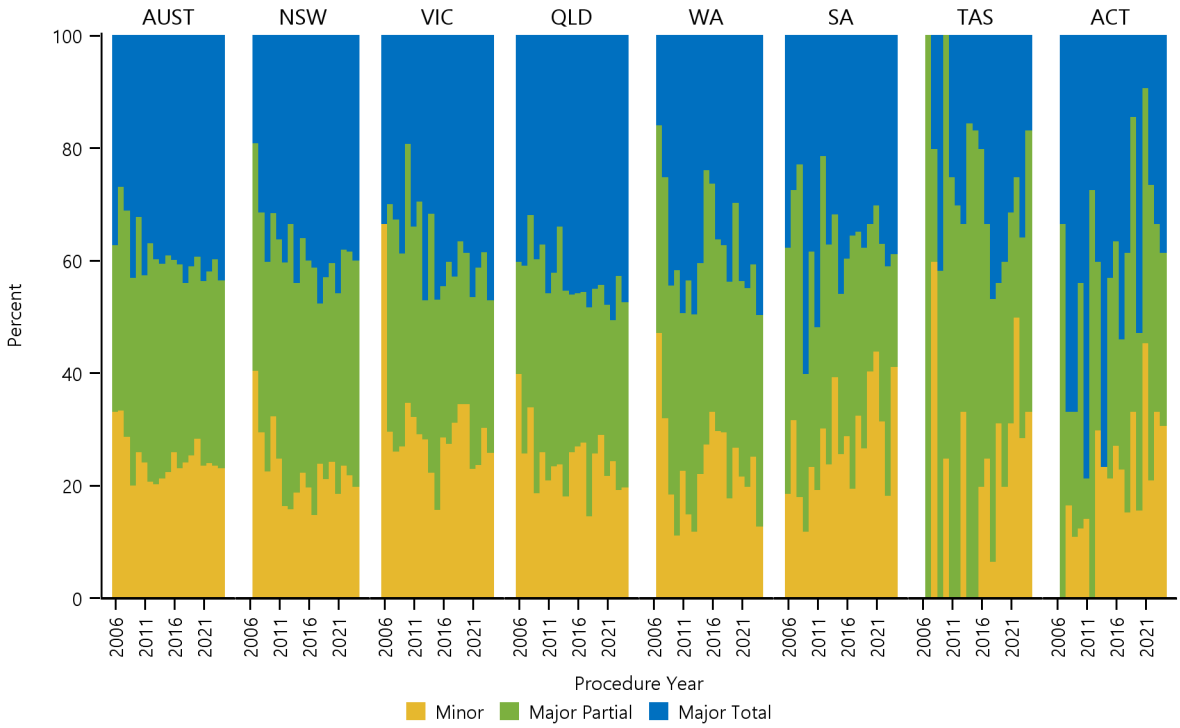
Table SSR16 Reason for Revision of All Shoulder Replacement

Reason for Revision	Number	Percent
Instability/Dislocation	2215	23.4
Infection	2028	21.4
Loosening	1710	18.1
Rotator Cuff Insufficiency	930	9.8
Fracture	681	7.2
Pain	365	3.9
Glenoid Erosion	301	3.2
Dissociation	226	2.4
Lysis	154	1.6
Implant Breakage Glenoid Insert	134	1.4
Arthrofibrosis	81	0.9
Implant Breakage Glenoid	79	0.8
Metal Related Pathology	72	0.8
Malposition	67	0.7
Incorrect Sizing	58	0.6
Wear Glenoid Insert	55	0.6
Wear Glenoid	39	0.4
Implant Breakage Humeral	26	0.3
Implant Breakage Head	24	0.3
Progression Of Disease	24	0.3
Wear Humeral Cup	22	0.2
Heterotopic Bone	19	0.2
Tumour	15	0.2
Osteonecrosis	12	0.1
Synovitis	2	0.0
Other	119	1.3
TOTAL	**9458**	**100.0**

Table SSR17 Type of Revision of All Shoulder Replacement

Type of Revision	Number	Percent
Humeral/Glenoid	3432	36.3
Humeral Component	2440	25.8
Cup/Head	678	7.2
Cement Spacer	674	7.1
Head Only	657	6.9
Glenoid Component	623	6.6
Cup Only	567	6.0
Removal of Prostheses	171	1.8
Head/Insert	62	0.7
Minor Components	53	0.6
Reoperation	39	0.4
Cement Only	38	0.4
Reinsertion of Components	14	0.1
Insert Only	6	0.1
Partial Resurfacing	4	0.0
TOTAL	**9458**	**100.0**

Figure SSR31 Trends in Usage of All Revision Shoulder Replacement by State/Territory and Year



Note: NT is excluded from this graph due to low procedure numbers

Primary Partial Shoulder Replacement

CLASSES OF PARTIAL SHOULDER REPLACEMENT

The Registry subcategorises primary partial shoulder replacement into four main classes. These are defined as:

Partial resurfacing anatomic involves the use of one or more button prostheses to replace part of the natural articulating surface, on one or both sides of the shoulder joint.

Hemi resurfacing anatomic involves the use of a humeral prosthesis that replaces the humeral articular surface only, without resecting the humeral head.

Hemi stemless anatomic involves resection of part of the humeral head and replacement with a humeral head and an epiphyseal fixation prosthesis.

Hemi stemmed anatomic involves the resection of the humeral head and replacement with a humeral head and a humeral stem prosthesis. A humeral stem prosthesis may have either metaphyseal or diaphyseal fixation.

Use of Partial Shoulder Replacement

There have been 8,404 primary partial shoulder replacements reported to the Registry up to 31 December 2024. This is an additional 297 procedures compared to the number reported last year.

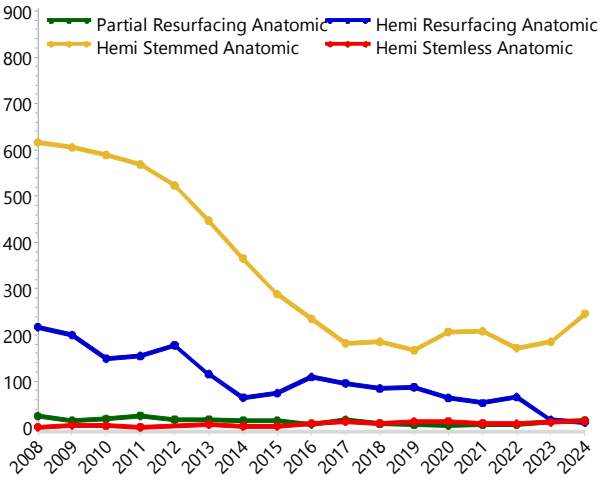
The most common class of primary partial shoulder replacement is hemi stemmed anatomic. This accounts for 73.3% of all partial shoulder replacements, followed by hemi resurfacing anatomic (22.4%), partial resurfacing anatomic (2.8%) and hemi stemless anatomic (1.5%) (Table SSR18).

Table SSR18 Primary Partial Shoulder Replacement by Class

Shoulder Class	Number	Percent
Partial Resurfacing Anatomic	239	2.8
Hemi Resurfacing Anatomic	1885	22.4
Hemi Stemmed Anatomic	6158	73.3
Hemi Stemless Anatomic	122	1.5
TOTAL	8404	100.0

The use of the two main classes of primary partial shoulder replacement has declined over the last 10 years. The number of hemi resurfacing anatomic procedures decreased from 178 in 2012 to 11 in 2024. The number of hemi stemmed anatomic procedures decreased from 616 in 2008 to 246 in 2024 (Figure SSR36).

Figure SSR32 Primary Partial Shoulder Replacement by Class



There is gender variation depending on the class of primary partial shoulder replacement. The proportions of primary partial shoulder replacement undertaken in females are hemi stemmed anatomic (65.5%), hemi stemless anatomic (35.2%), hemi resurfacing anatomic (39.9%) and partial resurfacing anatomic (21.3%) (Table SSR19).

Table SSR19 Primary Partial Shoulder Replacement by Class and Gender

Shoulder Class	Male		Female		TOTAL	
	N	Row%	N	Row%	N	Row%
Partial Resurfacing Anatomic	188	78.7	51	21.3	239	100.0
Hemi Resurfacing Anatomic	1132	60.1	753	39.9	1885	100.0
Hemi Stemmed Anatomic	2127	34.5	4031	65.5	6158	100.0
Hemi Stemless Anatomic	79	64.8	43	35.2	122	100.0
TOTAL	**3526**	**42.0**	**4878**	**58.0**	**8404**	**100.0**

The proportion of patients aged ≥65 years also varies depending on the class of primary partial shoulder replacement: hemi stemmed anatomic (63.2%), hemi resurfacing anatomic (47.1%), hemi stemless anatomic (25.4%) and partial resurfacing anatomic (15.9%) (Table SSR20).

Overall, males undergoing primary partial shoulder replacement are younger (mean age 59.5 years) compared to females (70.5 years) (Table SSR21).

The most common primary diagnosis for females is fracture (50.6%). For males, the most common primary diagnosis is osteoarthritis (60.0%) (Table SSR22).

The cumulative percent revision varies depending on class. Partial resurfacing anatomic and hemi stemless anatomic have only been used in small numbers (239 and 122 procedures, respectively). This makes any assessment of comparative performance difficult. However, there is a clear difference in the two more commonly used classes of hemi resurfacing anatomic and hemi stemmed anatomic. Devices in these classes have a longer follow-up, and the cumulative percent revision at 14 years for hemi resurfacing anatomic is greater than for hemi stemmed anatomic (19.3% compared to 13.3%, respectively) (Table SSR23 and Figure SSR37).

Primary partial shoulder replacement by joint class and head material are shown in Table SSR24.

Table SSR20 Primary Partial Shoulder Replacement by Class and Age

Shoulder Class	<55		55-64		65-74		≥75		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Partial Resurfacing Anatomic	182	76.2	19	7.9	22	9.2	16	6.7	239	100.0
Hemi Resurfacing Anatomic	467	24.8	531	28.2	554	29.4	333	17.7	1885	100.0
Hemi Stemmed Anatomic	937	15.2	1330	21.6	1712	27.8	2179	35.4	6158	100.0
Hemi Stemless Anatomic	65	53.3	26	21.3	20	16.4	11	9.0	122	100.0
TOTAL	**1651**	**19.6**	**1906**	**22.7**	**2308**	**27.5**	**2539**	**30.2**	**8404**	**100.0**

Table SSR21 Age and Gender of Primary Partial Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	3526	42.0%	14	94	61	59.5	14.5
Female	4878	58.0%	13	101	72	70.5	12.1
TOTAL	**8404**	**100.0%**	**13**	**101**	**67**	**65.9**	**14.2**

Table SSR22 Primary Partial Shoulder Replacement by Primary Diagnosis and Gender

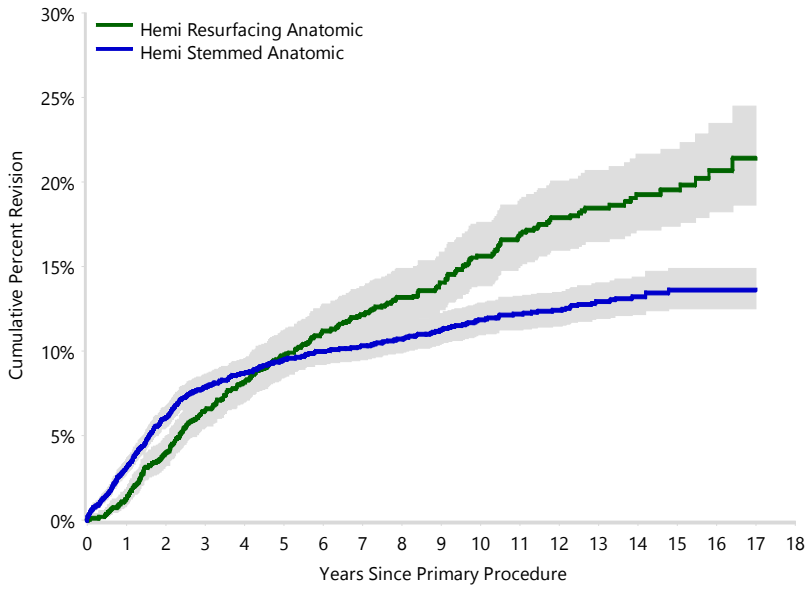
Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Osteoarthritis	2116	60.0	1690	34.6	3806	45.3
Fracture	783	22.2	2468	50.6	3251	38.7
Rotator Cuff Arthropathy	134	3.8	232	4.8	366	4.4
Osteonecrosis	142	4.0	179	3.7	321	3.8
Instability	188	5.3	78	1.6	266	3.2
Tumour	124	3.5	86	1.8	210	2.5
Rheumatoid Arthritis	23	0.7	112	2.3	135	1.6
Other Inflammatory Arthritis	13	0.4	30	0.6	43	0.5
Osteochondritis Dissecans	2	0.1	.	.	2	0.0
Other	1	0.0	3	0.1	4	0.0
TOTAL	**3526**	**100.0**	**4878**	**100.0**	**8404**	**100.0**

Note: Instability includes instability, dislocation, and Hills-Sachs Defect

Table SSR23 Cumulative Percent Revision of Primary Partial Shoulder Replacement by Class (All Diagnoses)

Shoulder Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Partial Resurfacing Anatomic	19	239	0.4 (0.1, 3.1)	1.4 (0.4, 4.2)	3.0 (1.3, 6.5)	5.2 (2.8, 9.4)	7.2 (4.2, 12.1)	11.1 (6.9, 17.8)
Hemi Resurfacing Anatomic	280	1885	1.3 (0.9, 1.9)	6.5 (5.4, 7.7)	9.7 (8.4, 11.2)	12.1 (10.7, 13.8)	15.6 (13.9, 17.6)	19.3 (17.2, 21.6)
Hemi Stemmed Anatomic	609	6158	3.1 (2.7, 3.6)	7.9 (7.2, 8.6)	9.5 (8.8, 10.3)	10.3 (9.5, 11.2)	11.9 (11.0, 12.9)	13.3 (12.2, 14.4)
Hemi Stemless Anatomic	16	122	5.3 (2.4, 11.5)	11.6 (6.7, 19.6)	16.5 (10.3, 25.6)			
TOTAL	**924**	**8404**						

Figure SSR33 Cumulative Percent Revision of Primary Partial Shoulder Replacement by Class (All Diagnoses)



HR - adjusted for age and gender

Hemi Stemmed Anatomic vs

Hemi Resurfacing Anatomic

0 - 9Mth: HR=3.38 (95% CI 1.95, 5.87), p<0.001

9Mth - 1.5Yr: HR=1.08 (95% CI 0.77, 1.52), p=0.656

1.5Yr - 2Yr: HR=1.73 (95% CI 1.00, 2.97), p=0.048

2Yr - 2.5Yr: HR=0.87 (95% CI 0.55, 1.36), p=0.534

2.5Yr+: HR=0.45 (95% CI 0.37, 0.56), p<0.001

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Hemi Resurfacing Anatomic	1885	1842	1633	1412	1164	820	366
Hemi Stemmed Anatomic	6158	5492	4498	3690	2978	2001	764

Table SSR24 Primary Partial Shoulder Replacement by Joint Class and Head Material (All Diagnoses)

Joint Class	CERAMIC		METAL		PYROCARBON		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%
Hemi Resurfacing Anatomic	.	.	1189	63.1	695	36.9	1884	100.0
Hemi Stemmed Anatomic	50	0.8	5187	84.3	916	14.9	6153	100.0
Hemi Stemless Anatomic	82	67.2	40	32.8	.	.	122	100.0
TOTAL	**132**	**1.6**	**6416**	**78.6**	**1611**	**19.7**	**8159**	**100.0**

Primary Partial Resurfacing Anatomic Shoulder Replacement

DEMOGRAPHICS AND OUTCOMES

There have been 239 primary partial resurfacing anatomic shoulder replacement procedures reported to the Registry. This is an additional 21 procedures compared to the previous report.

This procedure is undertaken more commonly in males (78.7%). The mean age for males is 38.0 years compared to 53.3 years for females (Table SSR25).

The most common primary diagnosis for males (60.6%) and females (45.1%) is instability (Table SSR26).

The cumulative percent revision at 10 years is 7.2% (Table SSR23). Of the 19 revisions, 11 are for glenoid erosion, 3 are for instability/dislocation, 2 are for rotator cuff insufficiency, and 1 each for loosening, lysis and infection. All but one underwent a humeral/glenoid revision.

Table SSR25 Age and Gender of Primary Partial Resurfacing Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	188	78.7%	14	87	34	38.0	17.0
Female	51	21.3%	16	88	54	53.3	20.1
TOTAL	**239**	**100.0%**	**14**	**88**	**38**	**41.3**	**18.7**

Table SSR26 Primary Partial Resurfacing Anatomic Shoulder Replacement by Primary Diagnosis and Gender

Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Instability	114	60.6	23	45.1	137	57.3
Osteoarthritis	53	28.2	21	41.2	74	31.0
Fracture	15	8.0	3	5.9	18	7.5
Osteonecrosis	2	1.1	3	5.9	5	2.1
Osteochondritis Dissecans	2	1.1	.	.	2	0.8
Rotator Cuff Arthropathy	2	1.1	.	.	2	0.8
Rheumatoid Arthritis	.	.	1	2.0	1	0.4
TOTAL	**188**	**100.0**	**51**	**100.0**	**239**	**100.0**

Primary Hemi Resurfacing Anatomic Shoulder Replacement

DEMOGRAPHICS

There have been 1,885 primary hemi resurfacing anatomic shoulder replacements reported to the Registry. This is an additional 11 procedures compared to the previous report. The use of primary hemi resurfacing has declined by 55.8% since 2008.

This procedure is more common in males (60.1%). The mean age is 59.6 years for males and 67.5 years for females (Table SSR27).

Osteoarthritis is the most common primary diagnosis (88.5%). The range of diagnoses is similar for males and females (Table SSR28).

Since 2021, all primary hemi resurfacing procedures reported to the Registry used the PyroTITAN (Table SSR29).

Table SSR27 Age and Gender of Primary Hemi Resurfacing Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	1132	60.1%	19	90	60	59.6	12.0
Female	753	39.9%	27	93	68	67.5	11.4
TOTAL	**1885**	**100.0%**	**19**	**93**	**63**	**62.7**	**12.4**

Table SSR28 Primary Hemi Resurfacing Anatomic Shoulder Replacement by Primary Diagnosis and Gender

Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Osteoarthritis	1009	89.1	660	87.6	1669	88.5
Rotator Cuff Arthropathy	51	4.5	36	4.8	87	4.6
Instability	31	2.7	7	0.9	38	2.0
Osteonecrosis	19	1.7	18	2.4	37	2.0
Rheumatoid Arthritis	9	0.8	19	2.5	28	1.5
Fracture	10	0.9	4	0.5	14	0.7
Other Inflammatory Arthritis	3	0.3	9	1.2	12	0.6
TOTAL	**1132**	**100.0**	**753**	**100.0**	**1885**	**100.0**

Note: Instability includes instability and dislocation

Table SSR29 Most Used Humeral Head Prostheses in Primary Hemi Resurfacing Anatomic Shoulder Replacement

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
124	Copeland	53	PyroTITAN	66	PyroTITAN	16	PyroTITAN	11	PyroTITAN
45	Global CAP								
34	SMR								
11	Aequalis								
2	Epoca RH								
1	Buechel-Pappas								
10 Most Used									
217	(6) 100.0%	53	(1) 100.0%	66	(1) 100.0%	16	(1) 100.0%	11	(1) 100.0%

OUTCOME FOR ALL DIAGNOSES

Reason for Revision

The main reasons for revision of primary hemi resurfacing anatomic shoulder replacement are glenoid erosion (28.6%), pain (18.6%), rotator cuff insufficiency (12.5%), and instability/dislocation (10.0%) (Table SSR30 and Figure SSR38).

There had been 16 reported breakages of the PyroTITAN prosthesis. Three of these breakages were reported secondary to loosening.

Table SSR30 **Primary Hemi Resurfacing Anatomic Shoulder Replacement by Reason for Revision (All Diagnoses)**

Reason for Revision	Number	Percent
Glenoid Erosion	80	28.6
Pain	52	18.6
Rotator Cuff Insufficiency	35	12.5
Instability/Dislocation	28	10.0
Loosening	23	8.2
Implant Breakage Head	16	5.7
Fracture	13	4.6
Lysis	10	3.6
Infection	8	2.9
Arthrofibrosis	3	1.1
Malposition	3	1.1
Metal Related Pathology	3	1.1
Wear Glenoid Insert	2	0.7
Incorrect Sizing	2	0.7
Osteonecrosis	1	0.4
Implant Breakage Humeral	1	0.4
TOTAL	280	100.0

Type of Revision

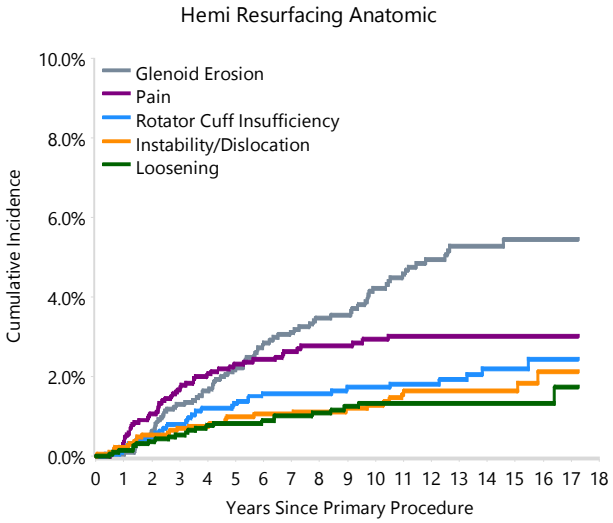
The most common type of revision is to a total shoulder replacement (88.6%) (Table SSR31). Of these, 162 (65.3%) were revised to a total reverse shoulder and 84 (33.9%) to a total stemmed shoulder replacement.

Glenoid erosion and pain are the reasons for 47.1% of all hemi resurfacing anatomic shoulder revisions.

Table SSR31 **Primary Hemi Resurfacing Anatomic Shoulder Replacement by Type of Revision (All Diagnoses)**

Type of Revision	Number	Percent
Humeral/Glenoid	248	88.6
Humeral Component	18	6.4
Glenoid Component	6	2.1
Cement Spacer	4	1.4
Removal of Prostheses	2	0.7
Reoperation	1	0.4
Head Only	1	0.4
TOTAL	280	100.0

Figure SSR34 **Cumulative Incidence Revision Diagnosis of Primary Hemi Resurfacing Anatomic Shoulder Replacement (All Diagnoses)**



OUTCOME FOR OSTEOARTHRITIS

Age and Gender

Patients aged 65-74 years have a lower rate of revision after 1.5 years compared to patients aged <55 years, whereas patients aged ≥75 years have a lower rate of revision after 2.5 years (Table SSR32 and Figure SSR39).

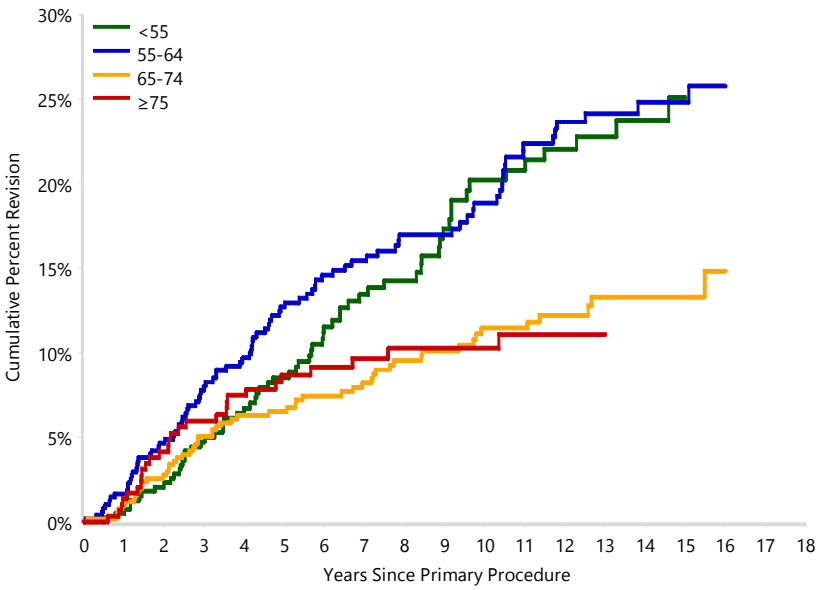
Females have a higher rate of revision than males (Table SSR33 and Figure SSR40).

The outcomes of the most commonly used prostheses are listed in Table SSR34. The PyroTITAN was the only hemi-resurfacing prosthesis remaining in use in 2024. It has a cumulative percent revision of 7.0% (95% CI 4.7, 10.2) at 10 years (Table SSR34).

Table SSR32 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	64	392	0.5 (0.1, 2.0)	4.7 (3.0, 7.4)	8.6 (6.1, 12.0)	13.4 (10.2, 17.7)	20.2 (15.8, 25.7)	23.8 (18.7, 30.0)
55-64	92	477	1.7 (0.8, 3.3)	8.0 (5.9, 10.9)	12.7 (9.9, 16.2)	15.4 (12.3, 19.3)	18.9 (15.3, 23.2)	24.8 (20.5, 30.0)
65-74	55	505	1.0 (0.4, 2.4)	5.0 (3.4, 7.4)	6.5 (4.7, 9.1)	8.2 (6.1, 11.1)	11.5 (8.8, 14.9)	13.3 (10.2, 17.3)
≥75	28	295	1.4 (0.5, 3.6)	6.0 (3.8, 9.4)	8.7 (5.9, 12.7)	9.7 (6.7, 13.9)	10.3 (7.1, 14.7)	
TOTAL	239	1669						

Figure SSR35 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)



HR - adjusted for gender

55-64 vs <55

Entire Period: HR=1.07 (95% CI 0.77, 1.48), p=0.690

65-74 vs <55

0 - 1Yr: HR=0.80 (95% CI 0.28, 2.32), p=0.683

1Yr - 1.5Yr: HR=0.78 (95% CI 0.31, 1.92), p=0.585

1.5Yr+: HR=0.48 (95% CI 0.32, 0.72), p<0.001

≥75 vs <55

0 - 1.5Yr: HR=0.96 (95% CI 0.43, 2.12), p=0.914

1.5Yr - 2.5Yr: HR=0.94 (95% CI 0.40, 2.25), p=0.896

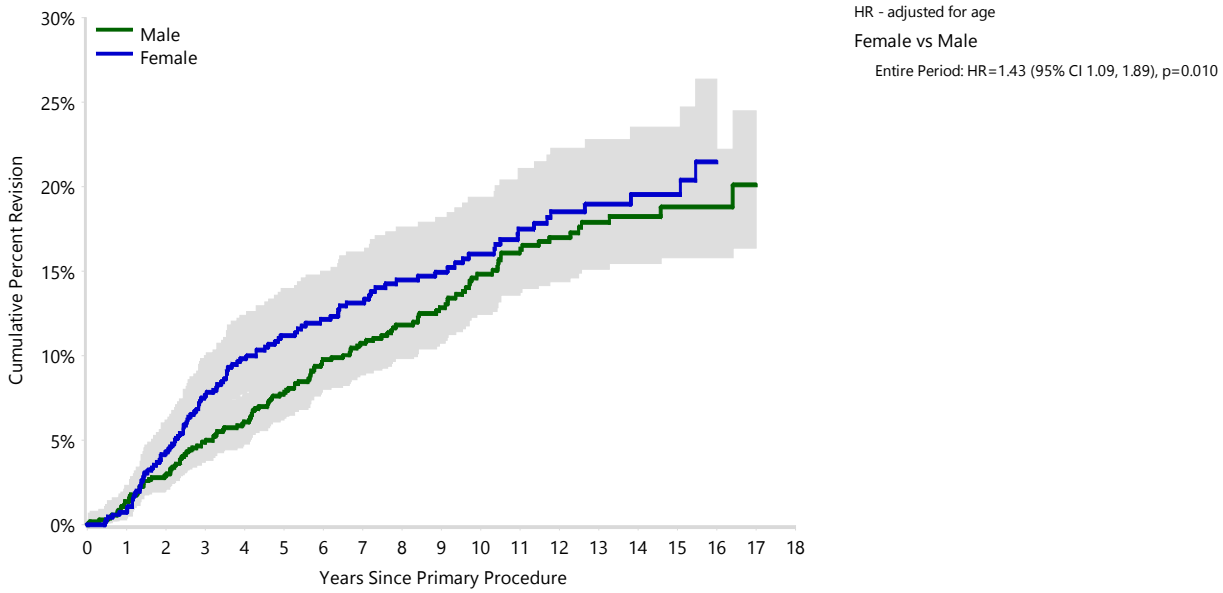
2.5Yr+: HR=0.29 (95% CI 0.15, 0.56), p<0.001

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	392	387	342	293	214	134	66
55-64	477	462	399	341	286	212	105
65-74	505	498	455	409	357	259	109
≥75	295	287	256	214	168	113	38

Table SSR33 **Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**

Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	135	1009	1.4 (0.8, 2.3)	4.9 (3.7, 6.4)	7.7 (6.2, 9.6)	10.7 (8.9, 13.0)	14.8 (12.5, 17.6)	18.3 (15.4, 21.5)
Female	104	660	0.8 (0.3, 1.8)	7.7 (5.8, 10.0)	11.2 (9.0, 14.0)	13.2 (10.7, 16.1)	16.0 (13.2, 19.4)	19.5 (16.2, 23.5)
TOTAL	**239**	**1669**						

Figure SSR36 **Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	1009	987	879	765	618	419	186
Female	660	647	573	492	407	299	132

Table SSR34 Cumulative Percent Revision of Primary Hemi Resurfacing Anatomic Shoulder Replacement by Humeral Head (Primary Diagnosis OA)

Humeral Head	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	18	78	1.3 (0.2, 8.9)	10.4 (5.3, 19.7)	15.9 (9.3, 26.3)	19.0 (11.7, 30.0)	23.6 (15.3, 35.3)	25.3 (16.7, 37.3)
Copeland	99	556	1.6 (0.8, 3.1)	6.6 (4.8, 9.0)	10.1 (7.8, 12.9)	12.7 (10.2, 15.9)	16.2 (13.2, 19.7)	20.0 (16.6, 24.0)
Global CAP	47	224	0.4 (0.1, 3.1)	9.0 (5.9, 13.6)	12.2 (8.5, 17.3)	15.5 (11.3, 21.0)	20.4 (15.5, 26.6)	23.4 (18.0, 30.1)
PyroTITAN	34	641	1.1 (0.5, 2.3)	3.1 (2.0, 4.8)	4.5 (3.1, 6.6)	5.0 (3.5, 7.2)	7.0 (4.7, 10.2)	
SMR	35	146	0.0 (0.0, 0.0)	7.0 (3.8, 12.6)	14.3 (9.4, 21.2)	20.7 (14.7, 28.6)	24.3 (17.8, 32.6)	
Other (4)	6	24	4.2 (0.6, 26.1)	16.7 (6.6, 38.5)	16.7 (6.6, 38.5)	21.9 (9.7, 45.1)	21.9 (9.7, 45.1)	29.7 (13.9, 56.3)
TOTAL	**239**	**1669**						

Note: Only prostheses with >50 procedures have been listed

Primary Hemi Stemless Anatomic Shoulder Replacement

DEMOGRAPHICS AND OUTCOME

There have been 122 primary hemi stemless anatomic shoulder replacement procedures reported to the Registry. This is an additional 14 procedures compared to the previous report.

This procedure is undertaken more commonly in males (64.8%). The mean age is 50.7 years for males and 62.6 years for females (Table SSR35).

Osteoarthritis is the most common primary diagnosis (63.1%) (Table SSR36).

Of the 16 revisions reported, 5 are for glenoid erosion, 3 for fracture, 3 for rotator cuff insufficiency, 2 for pain, and 1 each for loosening, instability/dislocation and arthrofibrosis (Table SSR37).

The most common type of revision is to a total shoulder replacement (Table SSR38).

The most common humeral head and stem prosthesis combinations are the Affinis/Affinis, Comprehensive/Comprehensive and the Eclipse/Eclipse. Outcomes for the most used prosthesis combinations are presented in Table SSR39.

Table SSR35 Age and Gender of Primary Hemi Stemless Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	79	64.8%	18	83	51	50.7	12.1
Female	43	35.2%	30	86	66	62.6	15.5
TOTAL	**122**	**100.0%**	**18**	**86**	**53**	**54.9**	**14.5**

Table SSR36 Primary Hemi Stemless Anatomic Shoulder Replacement by Primary Diagnosis and Gender

Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Osteoarthritis	50	63.3	27	62.8	77	63.1
Osteonecrosis	19	24.1	11	25.6	30	24.6
Fracture	3	3.8	3	7.0	6	4.9
Rotator Cuff Arthropathy	4	5.1	.	.	4	3.3
Instability	1	1.3	1	2.3	2	1.6
Rheumatoid Arthritis	.	.	1	2.3	1	0.8
Other Inflammatory Arthritis	1	1.3	.	.	1	0.8
Other	1	1.3	.	.	1	0.8
TOTAL	**79**	**100.0**	**43**	**100.0**	**122**	**100.0**

Table SSR37 Primary Hemi Stemless Anatomic Shoulder Replacement by Reason for Revision

Reason for Revision	Number	Percent
Glenoid Erosion	5	31.3
Fracture	3	18.8
Rotator Cuff Insufficiency	3	18.8
Pain	2	12.5
Loosening	1	6.3
Instability/Dislocation	1	6.3
Arthrofibrosis	1	6.3
TOTAL	**16**	**100.0**

Note: Fracture includes proximal humerus fracture

Table SSR38 Primary Hemi Stemless Anatomic Shoulder Replacement by Type of Revision

Type of Revision	Number	Percent
Humeral/Glenoid	8	50.0
Glenoid Component	5	31.3
Humeral Component	2	12.5
Head Only	1	6.3
TOTAL	**16**	**100.0**

Table SSR39 Cumulative Percent Revision of Primary Hemi Stemless Anatomic Shoulder Replacement by Prosthesis Combination

Humeral Head	Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Affinis	Affinis	7	82	4.2 (1.4, 12.4)	7.1 (3.0, 16.3)	10.7 (5.2, 21.4)	10.7 (5.2, 21.4)		
Affiniti	Simpliciti	4	7	0.0 (0.0, 0.0)	48.6 (18.7, 88.2)	65.7 (31.5, 95.2)	65.7 (31.5, 95.2)	65.7 (31.5, 95.2)	
Comprehensive	Comprehensive	2	11	18.2 (4.9, 55.3)	18.2 (4.9, 55.3)				
Eclipse	Eclipse	1	10	0.0 (0.0, 0.0)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)	11.1 (1.6, 56.7)
Simpliciti	Simpliciti	1	7	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)		
Other (4)		1	5	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)		
TOTAL		**16**	**122**						

Note: Only prostheses with >7 procedures have been listed

Primary Hemi Stemmed Anatomic Shoulder Replacement

DEMOGRAPHICS

There have been 6,158 primary hemi stemmed anatomic shoulder replacement procedures reported to the Registry. This is an additional 251 procedures compared to the previous report.

This procedure is more common in females (65.5%). The mean age is 71.4 years for females and 61.6 years for males (Table SSR40).

The most common primary diagnosis is fracture (52.2%), followed by osteoarthritis (32.3%) (Table SSR41). In 2024, the number of primary hemi stemmed anatomic shoulder replacements undertaken for fracture decreased by 92.1% compared to 2008. In 2024, the number of primary hemi stemmed anatomic shoulder replacements undertaken for osteoarthritis decreased by 9.6% compared to 2008 (Figure SSR41).

The most common humeral head prostheses used in 2024 are the Ascend Flex PyC, Comprehensive and Ascend Flex.

The 10 most used humeral head prostheses account for 98.8% of all primary hemi stemmed anatomic procedures in 2024. This has slightly increased from 98.2% in 2008 (Table SSR42).

The most common humeral stem prostheses used in 2024 are the Ascend Flex, Comprehensive, Global Unite and SMR. The 10 most used humeral stem prostheses account for 99.6% of all primary hemi stemmed procedures in 2024. This has increased from 97.2% in 2008 (Table SSR43).

There has been a major decline in the use of primary hemi stemmed anatomic shoulder replacement for the management of fracture.

Table SSR40 Age and Gender of Primary Hemi Stemmed Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	2127	34.5%	14	94	62	61.6	13.8
Female	4031	65.5%	13	101	73	71.4	11.8
TOTAL	**6158**	**100.0%**	**13**	**101**	**69**	**68.0**	**13.4**

Table SSR41 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Gender

Primary Diagnosis	Male		Female		TOTAL	
	N	Col%	N	Col%	N	Col%
Fracture	755	35.5	2458	61.0	3213	52.2
Osteoarthritis	1004	47.2	982	24.4	1986	32.3
Rotator Cuff Arthropathy	77	3.6	196	4.9	273	4.4
Osteonecrosis	102	4.8	147	3.6	249	4.0
Tumour	124	5.8	86	2.1	210	3.4
Rheumatoid Arthritis	14	0.7	91	2.3	105	1.7
Instability	42	2.0	47	1.2	89	1.4
Other Inflammatory Arthritis	9	0.4	21	0.5	30	0.5
Other	.	.	3	0.1	3	0.0
TOTAL	**2127**	**100.0**	**4031**	**100.0**	**6158**	**100.0**

Note: Instability includes instability and dislocation

Figure SSR37 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis

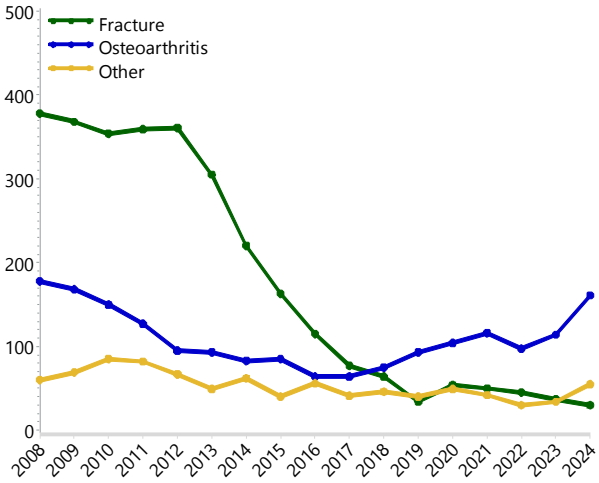


Table SSR42 10 Most Used Humeral Head Prostheses in Primary Hemi Stemmed Anatomic Shoulder Replacement

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
197	Global Advantage	129	Ascend Flex PyC	105	Ascend Flex PyC	132	Ascend Flex PyC	179	Ascend Flex PyC
177	SMR	15	Comprehensive	14	Equinoxe	14	Comprehensive	18	Comprehensive
98	Aequalis	15	Equinoxe	10	Comprehensive	9	Global Unite	11	Ascend Flex
38	Bigliani/Flatow	9	SMR CTA	8	Mutars	6	Mutars	11	Global Unite
31	SMR CTA	8	Global Unite	6	SMR	6	SMR CTA	6	Equinoxe
22	Global Advantage CTA	6	Aequalis	6	SMR CTA	5	SMR	6	SMR CTA
15	Bio-Modular	6	Ascend Flex	5	Aequalis	3	Delta Xtend	5	Mutars
13	Solar	6	SMR	5	Ascend Flex	3	Equinoxe	3	SMR
8	Global AP	5	Mutars	5	Global Unite	2	Aequalis	2	Aequalis
6	Univers 3D	4	Mets	3	Delta Xtend	2	Affinis	2	Affinis
10 Most Used									
605 (10) 98.2%		203 (10) 97.6%		167 (10) 97.1%		182 (10) 98.4%		243 (10) 98.8%	
Remainder									
11 (4) 1.8%		5 (3) 2.4%		5 (3) 2.9%		3 (2) 1.6%		3 (2) 1.2%	
TOTAL									
616 (14) 100.0%		208 (13) 100.0%		172 (13) 100.0%		185 (12) 100.0%		246 (12) 100.0%	

Table SSR43 10 Most Used Humeral Stem Prostheses in Primary Hemi Stemmed Anatomic Shoulder Replacement

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
207	SMR	127	Ascend Flex	106	Ascend Flex	127	Ascend Flex	184	Ascend Flex
138	Global FX	15	Comprehensive	14	Equinoxe	14	Comprehensive	18	Comprehensive
98	Aequalis	15	Equinoxe	12	SMR	11	SMR	11	Global Unite
81	Global Advantage	15	SMR	10	Comprehensive	8	Global Unite	9	SMR
26	Bigliani/Flatow TM	8	Aequalis Flex Revive	8	Mutars	6	Aequalis Flex Revive	6	Aequalis Flex Revive
13	Solar	6	Aequalis	5	Aequalis	6	Mutars	6	Equinoxe
11	Bigliani/Flatow	6	Global Unite	4	Aequalis Flex Revive	4	Global AP	5	Mutars
11	Bio-Modular	5	Mutars	4	Global AP	3	Equinoxe	2	Aequalis
8	Global AP	4	Mets	4	Global Unite	2	Aequalis	2	Affinis
6	Univers 3D	3	Affinis	2	Affinis	2	Affinis	2	AltiVate Reverse
10 Most Used									
599	(10) 97.2%	204	(10) 98.1%	169	(10) 98.3%	183	(10) 98.9%	245	(10) 99.6%
Remainder									
17	(7) 2.8%	4	(2) 1.9%	3	(2) 1.7%	2	(1) 1.1%	1	(1) 0.4%
TOTAL									
616	(17) 100.0%	208	(12) 100.0%	172	(12) 100.0%	185	(11) 100.0%	246	(11) 100.0%

OUTCOME FOR ALL DIAGNOSES

Primary Diagnosis

Primary hemi stemmed anatomic shoulder replacement performed for fracture has a higher rate of revision than when performed for osteoarthritis in the first 2.5 years. After this time there is no difference (Table SSR44 and Figure SSR42).

Reason for Revision

Reasons for revision vary depending on the primary diagnosis. Rotator cuff insufficiency occurs more frequently in hemi stemmed anatomic shoulder replacement undertaken for fracture (26.8%), whereas glenoid erosion occurs more frequently in procedures undertaken for osteoarthritis (28.8%) (Table SSR45 and Figure SSR43).

Type of Revision

The most common type of revision is to a total shoulder replacement for both primary diagnoses (72.7% for fracture and 62.2% for osteoarthritis) (Table SSR46). Most were revised to a total reverse shoulder replacement (98.1% when used for fracture and 87.6% for osteoarthritis). Glenoid component only revision occurs more commonly in procedures undertaken for osteoarthritis (23.1% compared to 4.6% for fracture).

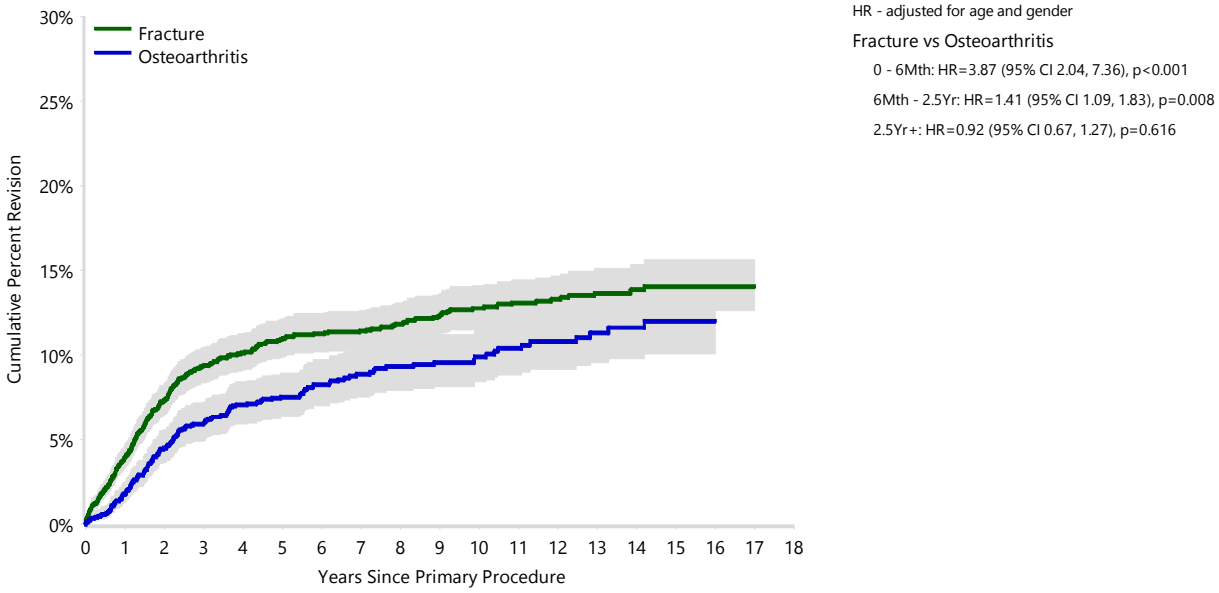
There is no difference in the rate of revision when primary hemi stemmed anatomic shoulder replacement is performed for fracture or osteoarthritis after the first 2.5 years.

Table SSR44 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis**

Primary Diagnosis	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	366	3213	4.0 (3.3, 4.7)	9.4 (8.4, 10.5)	11.0 (9.9, 12.1)	11.4 (10.3, 12.6)	12.8 (11.5, 14.1)	13.8 (12.5, 15.4)
Osteoarthritis	156	1986	1.8 (1.3, 2.5)	5.9 (4.9, 7.2)	7.5 (6.4, 8.9)	8.9 (7.5, 10.4)	9.9 (8.4, 11.6)	11.6 (9.8, 13.8)
Rotator Cuff Arthropathy	22	273	3.0 (1.5, 5.9)	5.8 (3.6, 9.5)	7.3 (4.6, 11.3)	7.3 (4.6, 11.3)	9.9 (6.4, 15.3)	
Osteonecrosis	22	249	2.1 (0.9, 5.0)	6.0 (3.5, 10.2)	7.8 (4.8, 12.5)	10.0 (6.4, 15.3)	12.1 (7.8, 18.4)	
Tumour	21	210	4.3 (2.1, 8.9)	10.2 (5.7, 17.9)	17.6 (10.6, 28.5)			
Rheumatoid Arthritis	10	105	1.0 (0.1, 6.8)	5.1 (2.2, 11.8)	6.2 (2.8, 13.2)	7.6 (3.7, 15.3)	13.3 (7.2, 24.1)	
Other (3)	12	122	5.1 (2.3, 11.1)	8.1 (4.3, 15.1)	8.1 (4.3, 15.1)	8.1 (4.3, 15.1)		
TOTAL	**609**	**6158**						

Note: Only primary diagnoses with >100 procedures have been listed

Figure SSR38 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	3213	2933	2459	2079	1732	1201	423
Osteoarthritis	1986	1761	1411	1109	854	563	250

Note: Only primary diagnoses with >1,000 procedures have been listed

Table SSR45 **Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Revision Diagnosis**

Revision Diagnosis	Fracture			Osteoarthritis		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Rotator Cuff Insufficiency	98	3.1	26.8	24	1.2	15.4
Instability/Dislocation	68	2.1	18.6	30	1.5	19.2
Glenoid Erosion	25	0.8	6.8	45	2.3	28.8
Infection	39	1.2	10.7	13	0.7	8.3
Loosening	36	1.1	9.8	10	0.5	6.4
Fracture	34	1.1	9.3	6	0.3	3.8
Pain	30	0.9	8.2	18	0.9	11.5
Arthrofibrosis	7	0.2	1.9	3	0.2	1.9
Dissociation	7	0.2	1.9	1	0.1	0.6
Malposition	7	0.2	1.9	1	0.1	0.6
Lysis	5	0.2	1.4			
Incorrect Sizing	2	0.1	0.5	3	0.2	1.9
Heterotopic Bone	1	0.0	0.3			
Implant Breakage Glenoid	1	0.0	0.3			
Osteonecrosis				1	0.1	0.6
Other	6	0.2	1.6	1	0.1	0.6
N Revision	**366**	**11.4**	**100.0**	**156**	**7.9**	**100.0**
N Primary	**3213**			**1986**		

Figure SSR39 **Cumulative Incidence Revision Diagnosis of Primary Hemi Stemmed Anatomic Shoulder by Primary Diagnosis**

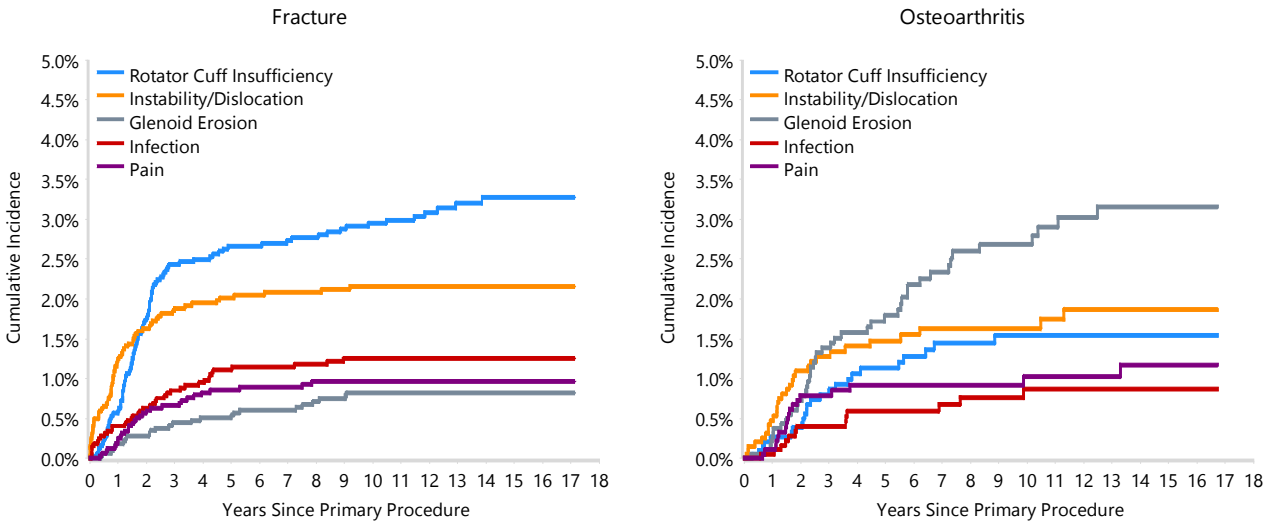


Table SSR46 Primary Hemi Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Type of Revision

Type of Revision	Fracture			Osteoarthritis		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Humeral/Glenoid	266	8.3	72.7	97	4.9	62.2
Glenoid Component	17	0.5	4.6	36	1.8	23.1
Humeral Component	31	1.0	8.5	8	0.4	5.1
Cement Spacer	20	0.6	5.5	5	0.3	3.2
Head Only	17	0.5	4.6	3	0.2	1.9
Removal of Prostheses	9	0.3	2.5	1	0.1	0.6
Cement Only	4	0.1	1.1			
Reoperation	2	0.1	0.5	4	0.2	2.6
Head/Insert				1	0.1	0.6
Minor Components				1	0.1	0.6
N Revision	**366**	**11.4**	**100.0**	**156**	**7.9**	**100.0**
N Primary	**3213**			**1986**		

OUTCOME FOR FRACTURE

Age and Gender

The rate of revision is lower for patients aged ≥75 years compared to all other age groups (Table SSR47 and Figure SSR44). Gender is not a risk factor for revision (Table SSR48 and Figure SSR45).

Cemented fixation has a lower rate of revision than cementless fixation when a non-fracture stem is used.

Humeral Stem

There is no difference in the rate of revision for fracture humeral stems compared to non-fracture humeral stems (Table SSR49 and Figure SSR46).

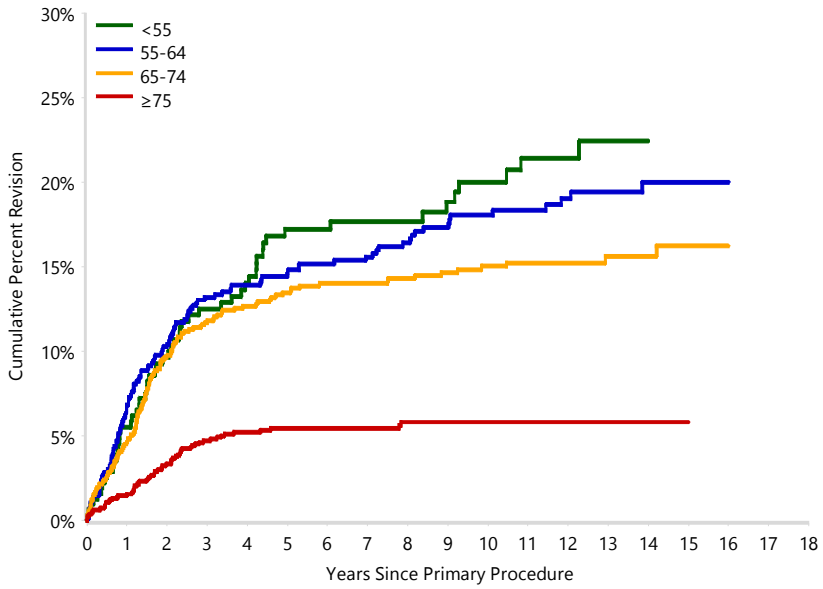
The use of cement for stem fixation in non-fracture hemiarthroplasty has a lower rate of revision than when a cementless non-fracture stem is used (Table SSR50 and Figure SSR47).

The outcomes for the most used prosthesis combinations for the treatment of fracture are listed in Table SSR51. The outcomes for individual fracture stems are presented separately in Table SSR52 and for non-fracture humeral stems in Table SSR53.

Table SSR47 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis Fracture)**

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	57	315	5.5 (3.5, 8.7)	12.5 (9.2, 16.9)	17.2 (13.3, 22.2)	17.7 (13.7, 22.7)	20.0 (15.6, 25.5)	22.4 (17.5, 28.5)
55-64	114	670	6.8 (5.2, 9.1)	13.2 (10.8, 16.1)	14.6 (12.1, 17.6)	15.6 (13.0, 18.7)	18.1 (15.2, 21.4)	20.0 (16.8, 23.8)
65-74	130	916	4.6 (3.5, 6.2)	11.8 (9.9, 14.1)	13.5 (11.4, 15.9)	14.0 (11.9, 16.5)	15.0 (12.8, 17.7)	15.6 (13.3, 18.4)
≥75	65	1312	1.6 (1.0, 2.4)	4.7 (3.7, 6.1)	5.5 (4.3, 7.0)	5.5 (4.3, 7.0)	5.8 (4.6, 7.4)	5.8 (4.6, 7.4)
TOTAL	**366**	**3213**						

Figure SSR40 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis Fracture)**



HR - adjusted for gender

<55 vs ≥75

0 - 4.5Yr: HR=3.68 (95% CI 2.49, 5.42), p<0.001

4.5Yr+: HR=4.58 (95% CI 2.13, 9.82), p<0.001

55-64 vs ≥75

Entire Period: HR=3.31 (95% CI 2.44, 4.50), p<0.001

65-74 vs ≥75

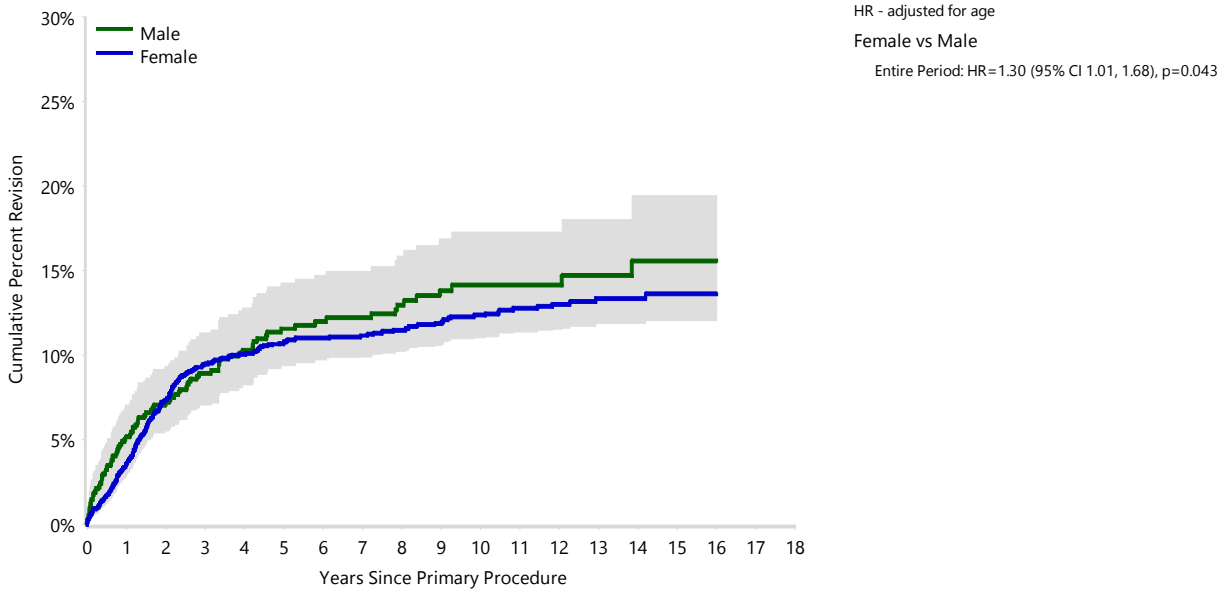
Entire Period: HR=2.70 (95% CI 2.00, 3.64), p<0.001

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	315	283	238	196	170	124	51
55-64	670	606	518	464	403	300	131
65-74	916	844	722	642	570	431	151
≥75	1312	1200	981	777	589	346	90

Table SSR48 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis Fracture)**

Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	90	755	5.2 (3.8, 7.0)	8.9 (7.0, 11.3)	11.6 (9.4, 14.3)	12.2 (9.9, 15.0)	14.1 (11.5, 17.3)	15.6 (12.5, 19.4)
Female	276	2458	3.6 (2.9, 4.4)	9.5 (8.4, 10.8)	10.8 (9.6, 12.1)	11.2 (9.9, 12.6)	12.4 (11.0, 13.9)	13.4 (11.9, 15.0)
TOTAL	**366**	**3213**						

Figure SSR41 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis Fracture)**

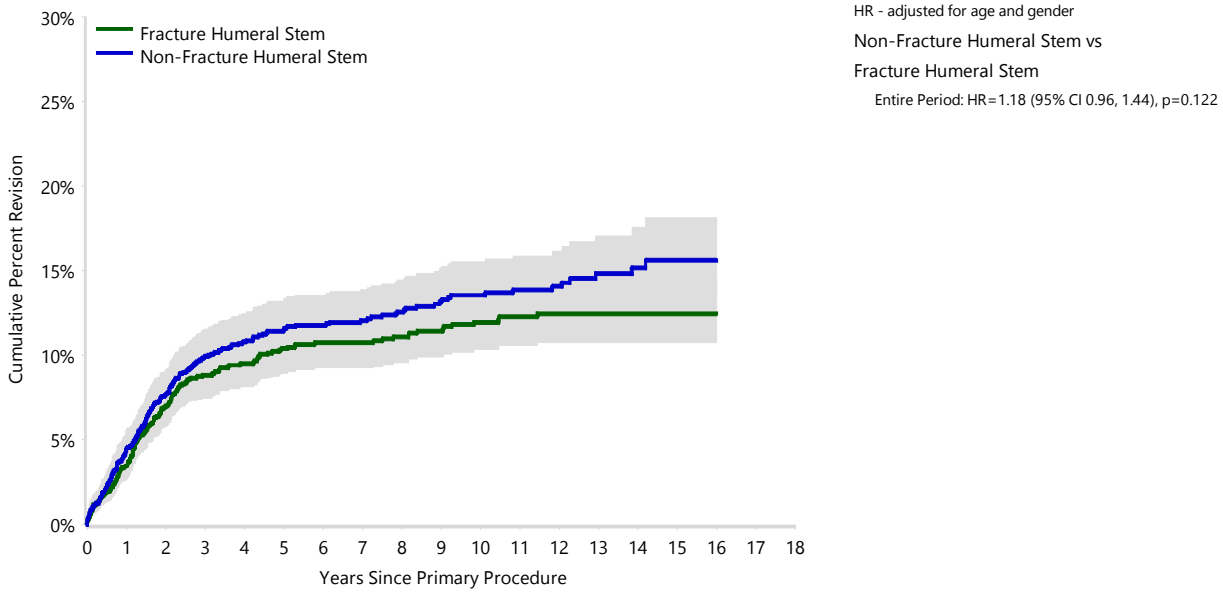


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	755	669	562	452	366	248	88
Female	2458	2264	1897	1627	1366	953	335

Table SSR49 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type (Primary Diagnosis Fracture)**

Stem Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	170	1598	3.4 (2.7, 4.5)	8.8 (7.5, 10.4)	10.4 (8.9, 12.1)	10.8 (9.3, 12.5)	12.0 (10.3, 13.8)	12.5 (10.8, 14.4)
Non-Fracture Humeral Stem	196	1615	4.5 (3.6, 5.6)	9.9 (8.5, 11.6)	11.5 (10.0, 13.3)	12.1 (10.5, 13.9)	13.6 (11.8, 15.5)	15.2 (13.1, 17.6)
TOTAL	**366**	**3213**						

Figure SSR42 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type (Primary Diagnosis Fracture)**

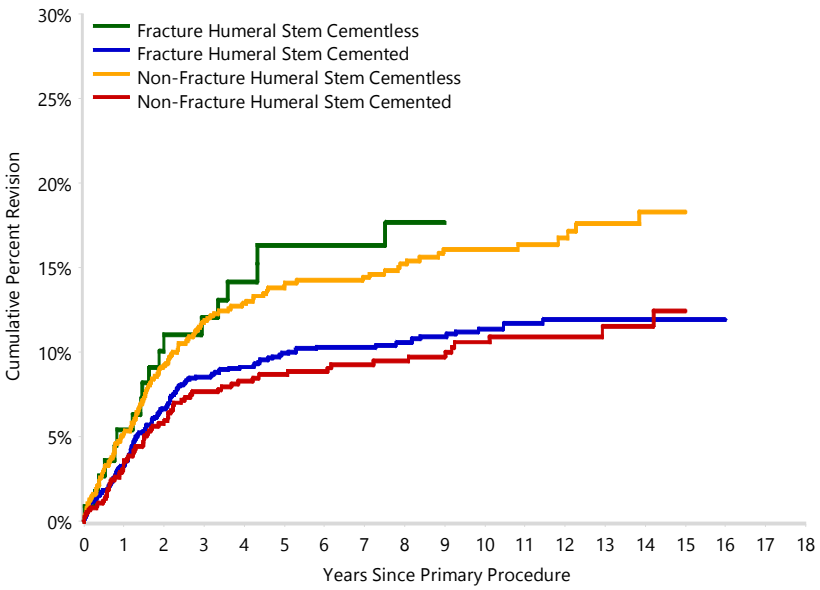


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	1598	1476	1248	1047	854	599	209
Non-Fracture Humeral Stem	1615	1457	1211	1032	878	602	214

Table SSR50 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type and Humeral Fixation (Primary Diagnosis Fracture)**

Stem Type	Humeral Fixation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	Cementless	19	112	5.4 (2.5, 11.7)	12.1 (7.2, 19.9)	16.3 (10.5, 25.0)	16.3 (10.5, 25.0)		
	Cemented	151	1486	3.3 (2.5, 4.4)	8.6 (7.2, 10.1)	9.9 (8.5, 11.7)	10.3 (8.8, 12.1)	11.4 (9.7, 13.3)	11.9 (10.2, 13.9)
Non-Fracture Humeral Stem	Cementless	126	865	5.2 (3.9, 6.9)	11.9 (9.8, 14.3)	13.9 (11.7, 16.6)	14.4 (12.1, 17.1)	16.1 (13.6, 19.0)	18.3 (15.3, 21.9)
	Cemented	70	750	3.6 (2.5, 5.3)	7.7 (5.9, 9.9)	8.7 (6.8, 11.1)	9.3 (7.3, 11.8)	10.6 (8.4, 13.4)	11.5 (9.0, 14.7)
TOTAL		**366**	**3213**						

Figure SSR43 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Stem Type and Humeral Fixation (Primary Diagnosis Fracture)**



HR - adjusted for age and gender

Fracture Humeral Stem Cementless vs Fracture Humeral Stem Cemented
Entire Period: HR=1.36 (95% CI 0.84, 2.20), p=0.205

Fracture Humeral Stem Cementless vs Non-Fracture Humeral Stem Cementless
Entire Period: HR=0.96 (95% CI 0.59, 1.56), p=0.878

Fracture Humeral Stem Cemented vs Non-Fracture Humeral Stem Cemented
Entire Period: HR=1.04 (95% CI 0.78, 1.38), p=0.787

Non-Fracture Humeral Stem Cementless vs Non-Fracture Humeral Stem Cemented
Entire Period: HR=1.47 (95% CI 1.10, 1.97), p=0.009

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	Cementless	112	103	85	74	65	34	6
	Cemented	1486	1373	1163	973	789	565	203
Non-Fracture Humeral Stem	Cementless	865	779	636	555	469	324	109
	Cemented	750	678	575	477	409	278	105

Table SSR51 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Humeral Stem (Primary Diagnosis Fracture)

Humeral Head	Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	42	474	3.0 (1.8, 5.0)	7.3 (5.2, 10.1)	8.1 (5.9, 11.0)	8.4 (6.1, 11.4)	9.1 (6.7, 12.3)	10.7 (7.8, 14.4)
Affinis	Affinis	7	51	6.1 (2.0, 17.9)	12.9 (6.0, 26.6)	15.5 (7.7, 29.9)	15.5 (7.7, 29.9)	15.5 (7.7, 29.9)	
Ascend Flex PyC	Ascend Flex	4	47	7.3 (2.4, 20.9)	11.1 (4.2, 27.7)	11.1 (4.2, 27.7)			
Bigliani/Flatow	Bigliani/Flatow TM	13	293	1.4 (0.5, 3.7)	3.6 (2.0, 6.6)	3.6 (2.0, 6.6)	4.1 (2.3, 7.3)	5.3 (3.1, 9.1)	5.3 (3.1, 9.1)
Bio-Modular	Comprehensive	7	79	2.6 (0.6, 9.9)	7.9 (3.6, 16.7)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	
Comprehensive	Comprehensive	10	106	4.9 (2.1, 11.3)	10.4 (5.7, 18.5)	10.4 (5.7, 18.5)			
Equinoxe	Equinoxe	6	39	8.0 (2.7, 22.9)	13.6 (5.9, 29.7)	20.3 (8.8, 42.6)			
Global Advantage	Global Advantage	10	53	7.7 (2.9, 19.1)	15.7 (8.1, 28.9)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	21.2 (11.8, 36.4)
	Global FX	60	695	2.2 (1.3, 3.6)	6.3 (4.6, 8.4)	7.9 (6.0, 10.3)	8.5 (6.5, 11.0)	10.0 (7.8, 12.8)	10.4 (8.1, 13.3)
Global Unite	Global Unite	40	178	8.5 (5.2, 13.7)	19.4 (14.2, 26.2)	22.8 (17.1, 30.0)	22.8 (17.1, 30.0)		
SMR	SMR	127	904	4.2 (3.1, 5.7)	11.0 (9.0, 13.3)	13.0 (10.9, 15.5)	13.8 (11.6, 16.3)	15.7 (13.3, 18.5)	17.2 (14.3, 20.5)
SMR CTA	SMR	7	46	9.3 (3.6, 22.8)	15.4 (7.2, 31.5)	19.5 (9.5, 37.4)	19.5 (9.5, 37.4)	19.5 (9.5, 37.4)	
Solar	Solar	5	40	7.9 (2.6, 22.5)	10.5 (4.1, 25.7)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)
Other (27)		28	208	5.9 (3.4, 10.2)	12.1 (8.2, 17.7)	13.4 (9.3, 19.3)	13.4 (9.3, 19.3)	14.3 (9.9, 20.4)	
TOTAL		**366**	**3213**						

Note: Only combinations with >30 procedures have been listed

Table SSR52 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Fracture Stem (Primary Diagnosis Fracture)

Humeral Head	Fracture Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	40	455	2.9 (1.7, 4.9)	7.4 (5.3, 10.3)	8.2 (6.0, 11.2)	8.5 (6.2, 11.6)	9.3 (6.8, 12.6)	10.2 (7.5, 13.8)
Affinis	Affinis	7	48	6.5 (2.2, 18.9)	13.7 (6.4, 28.2)	16.4 (8.2, 31.6)	16.4 (8.2, 31.6)	16.4 (8.2, 31.6)	
Bio-Modular	Comprehensive	7	79	2.6 (0.6, 9.9)	7.9 (3.6, 16.7)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	9.3 (4.6, 18.6)	
Comprehensive	Comprehensive	10	89	5.8 (2.5, 13.4)	12.0 (6.7, 21.3)	12.0 (6.7, 21.3)	12.0 (6.7, 21.3)	12.0 (6.7, 21.3)	
Equinoxe	Equinoxe	4	31	3.4 (0.5, 22.1)	10.6 (3.5, 29.5)	19.6 (6.9, 48.5)			
Global Advantage	Global FX	60	695	2.2 (1.3, 3.6)	6.3 (4.6, 8.4)	7.9 (6.0, 10.3)	8.5 (6.5, 11.0)	10.0 (7.8, 12.8)	10.4 (8.1, 13.3)
Global Unite	Global Unite	40	176	8.6 (5.3, 13.9)	19.6 (14.4, 26.5)	23.0 (17.3, 30.3)	23.0 (17.3, 30.3)		
Other (4)		2	25	0.0 (0.0, 0.0)	9.1 (2.4, 31.9)	9.1 (2.4, 31.9)	9.1 (2.4, 31.9)	9.1 (2.4, 31.9)	9.1 (2.4, 31.9)
TOTAL		**170**	**1598**						

Note: Only combinations with >30 procedures have been listed

Table SSR53 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Non-Fracture Stem (Primary Diagnosis Fracture)

Humeral Head	Non Fracture Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Ascend Flex PyC	Ascend Flex	4	47	7.3 (2.4, 20.9)	11.1 (4.2, 27.7)	11.1 (4.2, 27.7)			
Bigliani/Flatow	Bigliani/ Flatow TM	13	293	1.4 (0.5, 3.7)	3.6 (2.0, 6.6)	3.6 (2.0, 6.6)	4.1 (2.3, 7.3)	5.3 (3.1, 9.1)	5.3 (3.1, 9.1)
Global Advantage	Global Advantage	10	53	7.7 (2.9, 19.1)	15.7 (8.1, 28.9)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	17.8 (9.7, 31.4)	21.2 (11.8, 36.4)
SMR	SMR	127	904	4.2 (3.1, 5.7)	11.0 (9.0, 13.3)	13.0 (10.9, 15.5)	13.8 (11.6, 16.3)	15.7 (13.3, 18.5)	17.2 (14.3, 20.5)
SMR CTA	SMR	7	46	9.3 (3.6, 22.8)	15.4 (7.2, 31.5)	19.5 (9.5, 37.4)	19.5 (9.5, 37.4)	19.5 (9.5, 37.4)	
Solar	Solar	5	40	7.9 (2.6, 22.5)	10.5 (4.1, 25.7)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)	13.7 (5.9, 30.0)
Other (29)		30	232	6.6 (4.1, 10.8)	11.3 (7.7, 16.4)	12.5 (8.7, 17.9)	12.5 (8.7, 17.9)	13.3 (9.2, 18.9)	
TOTAL		**196**	**1615**						

Note: Only combinations with >30 procedures have been listed

OUTCOME FOR OSTEOARTHRITIS

Age and Gender

The rate of revision is lower for patients aged ≥75 years compared to patients aged <55 years after 2.5 years, and when compared to the 55-64 year age group after 2 years. There is no difference in the rate of revision when patients aged ≥75 years and 65-74 years are compared (Table SSR54 and Figure SSR48).

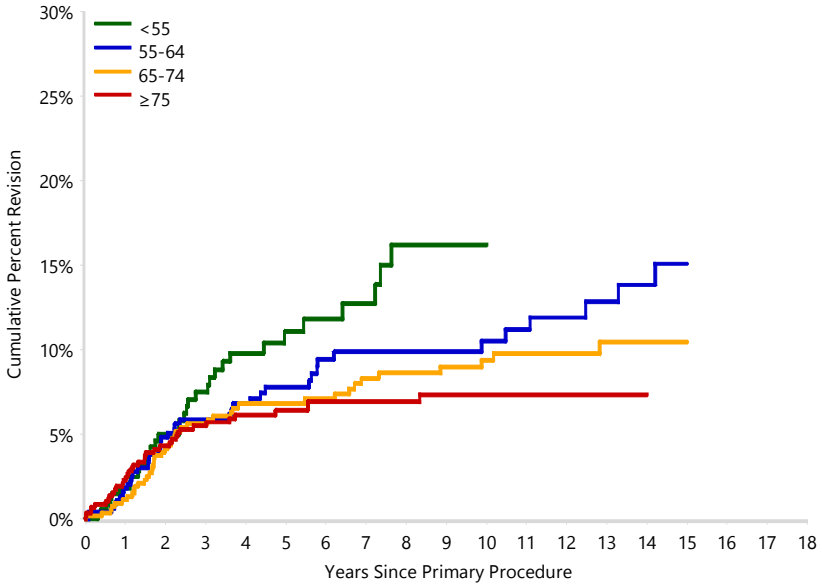
Gender is not a risk factor for revision (Table SSR55 and Figure SSR49).

The outcomes of the most used prosthesis combinations for osteoarthritis are listed in Table SSR56.

Table SSR54 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	35	371	1.8 (0.8, 4.0)	7.5 (4.9, 11.3)	11.1 (7.7, 15.8)	12.7 (8.9, 18.1)	16.2 (11.3, 23.0)	
55-64	41	483	1.8 (0.9, 3.6)	5.9 (4.0, 8.7)	7.8 (5.5, 11.0)	9.9 (7.1, 13.6)	10.5 (7.6, 14.5)	13.8 (9.9, 19.2)
65-74	43	548	1.1 (0.5, 2.5)	5.6 (3.9, 8.1)	6.8 (4.9, 9.5)	8.3 (6.1, 11.3)	9.4 (6.9, 12.6)	10.5 (7.7, 14.1)
≥75	37	584	2.5 (1.5, 4.1)	5.5 (3.9, 7.8)	6.4 (4.6, 8.9)	6.9 (5.0, 9.5)	7.4 (5.3, 10.1)	7.4 (5.3, 10.1)
TOTAL	156	1986						

Figure SSR44 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)



HR - adjusted for gender

<55 vs ≥75

0 - 2.5Yr: HR=1.55 (95% CI 0.85, 2.86), p=0.155

2.5Yr+: HR=4.88 (95% CI 2.50, 9.51), p<0.001

55-64 vs ≥75

0 - 1.5Yr: HR=1.22 (95% CI 0.61, 2.43), p=0.566

1.5Yr - 6Yr: HR=1.94 (95% CI 1.08, 3.50), p=0.026

6Yr+: HR=2.21 (95% CI 0.85, 5.76), p=0.103

65-74 vs ≥75

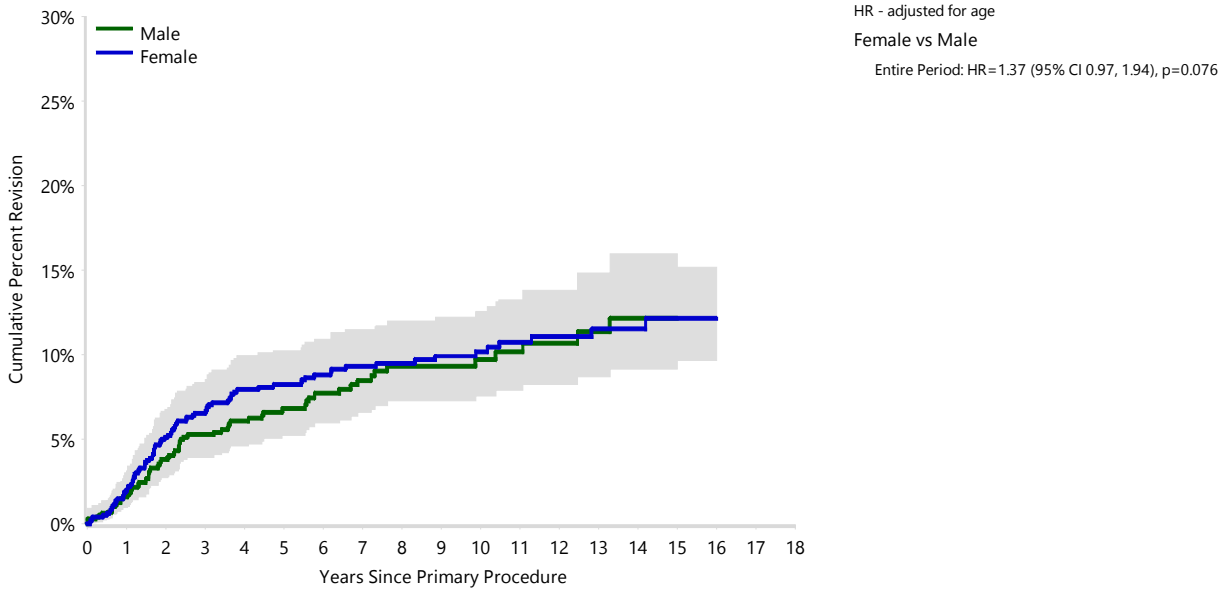
Entire Period: HR=1.25 (95% CI 0.80, 1.95), p=0.320

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<55	371	299	213	133	85	49	20
55-64	483	413	328	248	187	140	77
65-74	548	510	418	344	297	221	112
≥75	584	539	452	384	285	153	41

Table SSR55 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**

Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	68	1004	1.6 (1.0, 2.7)	5.3 (3.9, 7.0)	6.8 (5.2, 8.9)	8.5 (6.6, 10.9)	9.7 (7.6, 12.5)	12.1 (9.2, 16.0)
Female	88	982	2.0 (1.3, 3.1)	6.6 (5.1, 8.4)	8.2 (6.6, 10.3)	9.3 (7.5, 11.5)	10.2 (8.2, 12.5)	11.5 (9.3, 14.3)
TOTAL	**156**	**1986**						

Figure SSR45 **Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	1004	857	651	461	338	225	95
Female	982	904	760	648	516	338	155

Table SSR56 Cumulative Percent Revision of Primary Hemi Stemmed Anatomic Shoulder Replacement by Humeral Head and Humeral Stem (Primary Diagnosis OA)

Humeral Head	Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	11	140	1.4 (0.4, 5.6)	5.1 (2.5, 10.5)	6.0 (3.0, 11.6)	8.8 (4.9, 15.3)	8.8 (4.9, 15.3)	8.8 (4.9, 15.3)
Ascend Flex	Ascend Flex	0	24	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
Ascend Flex PyC	Ascend Flex	20	703	0.5 (0.2, 1.5)	2.8 (1.6, 4.7)	4.6 (2.9, 7.4)	5.4 (3.3, 8.9)		
Bigliani/Flatow	Bigliani/Flatow TM	5	53	3.8 (1.0, 14.3)	7.5 (2.9, 18.9)	7.5 (2.9, 18.9)	10.0 (4.3, 22.6)	10.0 (4.3, 22.6)	10.0 (4.3, 22.6)
Comprehensive	Comprehensive	3	38	0.0 (0.0, 0.0)	8.7 (2.2, 30.5)	8.7 (2.2, 30.5)	15.2 (5.0, 41.1)	15.2 (5.0, 41.1)	
Delta Xtend	Delta Xtend	3	33	3.0 (0.4, 19.6)	9.9 (3.3, 27.7)	9.9 (3.3, 27.7)	9.9 (3.3, 27.7)	9.9 (3.3, 27.7)	
Equinoxe	Equinoxe	4	20	5.3 (0.8, 31.9)	23.3 (9.4, 51.2)	23.3 (9.4, 51.2)			
Global AP	Global AP	12	168	0.6 (0.1, 4.1)	4.2 (2.0, 8.6)	6.1 (3.3, 11.0)	6.8 (3.8, 11.9)	6.8 (3.8, 11.9)	
Global AP CTA	Global AP	5	50	2.0 (0.3, 13.4)	10.2 (4.4, 22.8)	10.2 (4.4, 22.8)	10.2 (4.4, 22.8)	10.2 (4.4, 22.8)	
Global Advantage	Global Advantage	17	144	0.7 (0.1, 4.8)	5.0 (2.4, 10.2)	7.3 (4.0, 13.1)	8.1 (4.6, 14.1)	10.9 (6.6, 17.8)	14.3 (9.1, 22.3)
	Global FX	4	31	3.2 (0.5, 20.8)	10.0 (3.3, 28.1)	10.0 (3.3, 28.1)	10.0 (3.3, 28.1)	15.7 (5.9, 37.8)	
Global Advantage CTA	Global Advantage	1	39	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	3.8 (0.6, 24.3)	3.8 (0.6, 24.3)	3.8 (0.6, 24.3)
Global Unite	Global Unite	1	36	0.0 (0.0, 0.0)	4.0 (0.6, 25.2)	4.0 (0.6, 25.2)	4.0 (0.6, 25.2)		
SMR	SMR	47	278	4.0 (2.3, 7.2)	9.7 (6.7, 13.9)	13.3 (9.7, 18.0)	15.5 (11.6, 20.5)	17.0 (12.9, 22.3)	19.3 (14.6, 25.2)
SMR CTA	SMR	10	105	5.8 (2.7, 12.5)	10.1 (5.5, 17.9)	10.1 (5.5, 17.9)	10.1 (5.5, 17.9)		
Other (26)		13	124	3.3 (1.2, 8.5)	8.5 (4.6, 15.2)	9.5 (5.4, 16.5)	9.5 (5.4, 16.5)	11.5 (6.5, 20.0)	
TOTAL		**156**	**1986**						

Note: Only combinations with >20 procedures have been listed

Primary Total Shoulder Replacement

Classes of Total Shoulder Replacement

Primary total shoulder replacement is subcategorised into five classes. These are defined by the type of prosthesis used. The stemless anatomic class of shoulder replacement has increased considerably. As such, mid head humeral prostheses are now classified as stemless anatomic and stemless reverse to reflect their differing polarity.

Total Resurfacing Anatomic involves glenoid replacement and the use of a humeral prosthesis that replaces the humeral articular surface without resecting the humeral head.

Total Stemless Anatomic involves glenoid replacement combined with resection of the humeral head and replacement with a humeral head and an epiphyseal fixation prosthesis.

Total Stemmed Anatomic involves glenoid replacement combined with resection of the humeral head and replacement with humeral head and humeral stem prostheses. A humeral stem prosthesis may have metaphyseal or diaphyseal fixation.

Total Stemmed Reverse involves glenoid replacement with a glenosphere prosthesis combined with resection of the humeral head and replacement with humeral cup and humeral stem prosthesis. A humeral stem prosthesis may have metaphyseal or diaphyseal fixation.

Total Stemless Reverse involves glenoid replacement with a glenosphere combined with resection of the humeral head and replacement by a humeral cup and an epiphyseal fixation humeral prosthesis.

Primary total stemmed reverse shoulder replacement accounts for 74.4% of all primary total shoulder replacements.

Primary total resurfacing anatomic shoulder replacement is no longer used. Therefore, detailed information on primary total resurfacing anatomic shoulder replacement is available in the supplementary report 'Prosthesis Types with No or Minimal Use' on the AOANJRR website: https://aoanjrr.sahmri.com/annual-reports-2025

Use of Total Shoulder Replacement

There are 89,484 primary total shoulder replacement procedures. Of these, total stemmed reverse is the most common, followed by total stemmed anatomic and total stemless anatomic. There have been no total resurfacing anatomic replacements in 2024.

The use of different prosthesis classes has changed over time with a major increase in the use of total stemmed reverse shoulder and a corresponding decline in the use of total stemmed anatomic shoulder replacement (Table SSR57). Total stemless reverse replacements have been undertaken in Australia since 2016 (Figure SSR50).

Figure SSR46 Primary Total Shoulder Replacement by Class

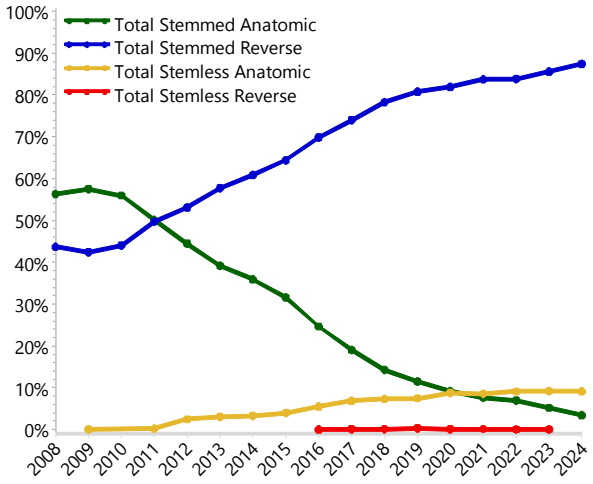


Table SSR57 Primary Total Shoulder Replacement by Class

Shoulder Class	Number	Percent
Total Stemmed Anatomic	16893	18.9
Total Stemmed Reverse	66607	74.4
Total Stemless Anatomic	5916	6.6
Total Stemless Reverse	68	0.1
TOTAL	**89484**	**100.0**

Note: Excludes 235 total resurfacing procedures

Primary Total Shoulder Replacement

Primary total shoulder replacement is undertaken more often in females, and this is true of all classes except for total stemless reverse, although numbers in this class are small (Table SSR58). The percentage of males undergoing primary total shoulder replacement has increased by 3.1% since 2016. The mean age for females is higher than for males (Table SSR59).

Most patients are aged ≥65 years. The proportion of the class of shoulder replacement varies between age groups, with total stemmed reverse predominating in the older age cohorts (Table SSR60).

Osteoarthritis is the most common primary diagnosis followed by rotator cuff arthropathy and fracture (Table SSR61).

Since 2016, the primary diagnosis osteoarthritis has decreased in proportion by 9.9% and rotator cuff arthropathy has increased by 10.6%.

The percentage of prostheses utilising highly cross-linked polyethylene (XLPE) and non-highly cross-linked polyethylene (non XLPE) in 2024 for primary total shoulder replacement was 39.4% and 50.7%, respectively.

The relative percentages had XLPE increase (6.3%) and non XLPE decrease (4.5%) compared to 2023 proportions.

To keep Registry data contemporaneous, only procedures using prostheses that have been available and used in 2024 (described as modern prostheses) are included in the analyses, unless clearly specified.

The rate of revision varies by class with total stemmed reverse and total stemless anatomic having a lower cumulative percent revision at 10 years than total stemmed anatomic shoulder replacement with a polyethylene glenoid. A polyethylene glenoid includes all glenoid types except modular metal backed glenoids (Table SSR62 and Figure SSR51). There are no primary total stemmed anatomic shoulder replacements with modular metal backed glenoids undertaken in 2024.

Detailed demographic information on primary total shoulder replacement is available in the supplementary report 'Demographics of Hip, Knee & Shoulder Arthroplasty' on the AOANJRR website: https://aoanjrr.sahmri.com/annual-reports-2025

Table SSR58 Primary Total Shoulder Replacement by Class and Gender

Shoulder Class	Male		Female		TOTAL	
	N	Row%	N	Row%	N	Row%
Total Stemmed Anatomic	7284	43.1	9609	56.9	16893	100.0
Total Stemmed Reverse	25664	38.5	40943	61.5	66607	100.0
Total Stemless Anatomic	2955	49.9	2961	50.1	5916	100.0
Total Stemless Reverse	47	69.1	21	30.9	68	100.0
TOTAL	**35950**	**40.2**	**53534**	**59.8**	**89484**	**100.0**

Table SSR59 Age and Gender of Primary Total Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	35950	40.2%	14	100	71	70.1	9.0
Female	53534	59.8%	12	103	74	73.4	8.3
TOTAL	**89484**	**100.0%**	**12**	**103**	**73**	**72.1**	**8.7**

Table SSR60 Primary Total Shoulder Replacement by Class and Age

Shoulder Class	<55		55-64		65-74		≥75		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Total Stemmed Anatomic	995	5.9	4045	23.9	7435	44.0	4418	26.2	16893	100.0
Total Stemmed Reverse	1156	1.7	7639	11.5	26223	39.4	31589	47.4	66607	100.0
Total Stemless Anatomic	640	10.8	1680	28.4	2505	42.3	1091	18.4	5916	100.0
TOTAL	**2791**	**3.1**	**13364**	**14.9**	**36163**	**40.4**	**37098**	**41.5**	**89416**	**100.0**

Note: Restricted to modern prostheses

Table SSR61 Primary Total Shoulder Replacement by Primary Diagnosis

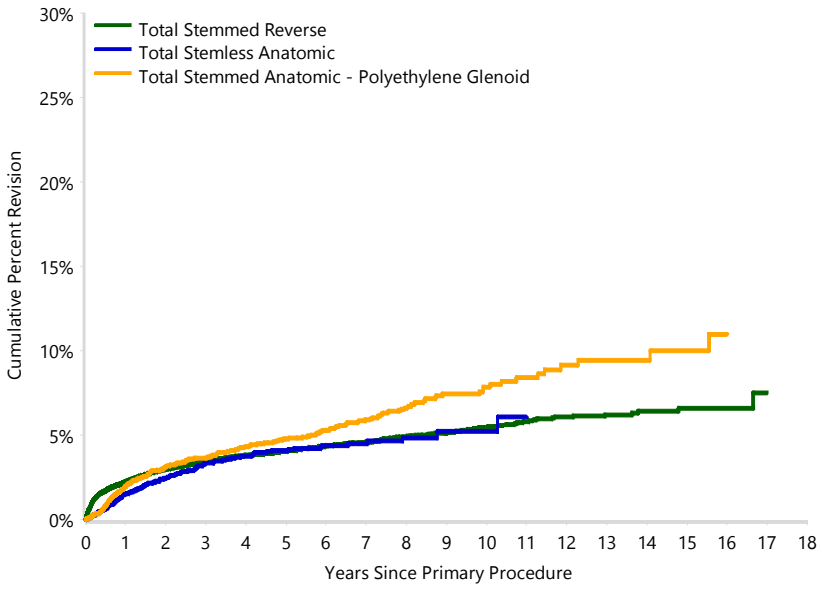
Primary Diagnosis	Number	Percent
Osteoarthritis	50453	56.4
Rotator Cuff Arthropathy	24922	27.9
Fracture	10053	11.2
Rheumatoid Arthritis	1390	1.6
Osteonecrosis	1138	1.3
Instability	737	0.8
Other Inflammatory Arthritis	469	0.5
Tumour	302	0.3
Other	20	0.0
TOTAL	**89484**	**100.0**

Table SSR62 Cumulative Percent Revision of Primary Total Shoulder Replacement by Class (All Diagnoses)

Shoulder Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemmed Reverse	2363	64636	2.2 (2.1, 2.4)	3.4 (3.3, 3.6)	4.0 (3.9, 4.2)	4.6 (4.4, 4.8)	5.5 (5.2, 5.8)	6.4 (5.9, 7.0)
Total Stemless Anatomic	172	5547	1.5 (1.2, 1.9)	3.4 (2.8, 3.9)	4.1 (3.5, 4.8)	4.5 (3.8, 5.3)	5.2 (4.2, 6.5)	
Total Stemmed Anatomic - Polyethylene Glenoid	288	5413	2.0 (1.6, 2.4)	3.7 (3.2, 4.2)	4.8 (4.2, 5.5)	5.9 (5.2, 6.7)	7.9 (6.9, 9.0)	9.5 (8.0, 11.2)
TOTAL	**2823**	**75596**						

Note: Restricted to modern prostheses.

Figure SSR47 Cumulative Percent Revision of Primary Total Shoulder Replacement by Class (All Diagnoses)



HR - adjusted for age and gender

Total Stemmed Reverse vs
Total Stemless Anatomic

0 - 3Mth: HR=6.00 (95% CI 4.22, 8.52), p<0.001

3Mth+: HR=0.98 (95% CI 0.83, 1.16), p=0.818

Total Stemmed Anatomic - Polyethylene Glenoid vs
Total Stemmed Reverse

0 - 3Mth: HR=0.21 (95% CI 0.13, 0.33), p<0.001

3Mth+: HR=1.41 (95% CI 1.24, 1.61), p<0.001

Total Stemmed Anatomic - Polyethylene Glenoid vs
Total Stemless Anatomic

Entire Period: HR=1.38 (95% CI 1.14, 1.66), p<0.001

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemmed Reverse	64636	53660	36956	23672	13305	4641	724
Total Stemless Anatomic	5547	4533	2863	1601	720	122	0
Total Stemmed Anatomic - Polyethylene Glenoid	5413	4943	3941	2944	1859	632	169

Note: Restricted to modern prostheses.

Primary Total Stemless Anatomic Shoulder Replacement

DEMOGRAPHICS

There are 5,916 primary total stemless anatomic shoulder replacements. This is an additional 929 procedures compared to the previous report.

For further information on the **closure of the database** please see the **Glossary** of this report.

The use of primary total stemless anatomic shoulder replacement has increased by 1208.45% since its first full year of use in 2012.

Primary total stemless anatomic shoulder replacement is more commonly performed in patients aged 65–74 years. Primary total stemless anatomic shoulder replacements are undertaken more often in females who are older on average than males (Table SSR63). However, in 2024 52% of primary total stemless shoulder replacements are undertaken in men. In 2024, 33.3% of total stemless shoulder replacements are cementless, 66.3% are hybrid (glenoid cemented) and 0.3% are cemented.

XLPE is more common in 2024 for total stemless anatomic replacement glenoid components (57.2%), compared to 42.8% for non XLPE.

Osteoarthritis is the most common primary diagnosis.

The most used total stemless anatomic prostheses are listed in Table SSR64 and Table SSR65.

Table SSR63 Age and Gender of Primary Total Stemless Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	2955	49.9%	31	95	65	64.1	9.4
Female	2961	50.1%	32	94	69	68.6	8.4
TOTAL	**5916**	**100.0%**	**31**	**95**	**67**	**66.3**	**9.2**

Table SSR64 Most Used Humeral Stem Prostheses in Primary Total Stemless Anatomic Shoulder Replacement

2011		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
2	Simpliciti	378	Affinis	400	Affinis	467	Affinis	481	Affinis
2	TESS	202	Simpliciti	216	Simpliciti	266	Simpliciti	284	Simpliciti
1	Affinis	58	Comprehensive	48	Comprehensive	72	Global Icon	66	Comprehensive
		21	Global Icon	37	Global Icon	50	Comprehensive	53	Global Icon
		6	Equinoxe	19	Equinoxe	25	Equinoxe	43	Equinoxe
		6	SMR	6	SMR	4	SMR	2	SMR
Most Used									
5	(3) 100.0%	671	(6) 100.0%	726	(6) 100.0%	884	(6) 100.0%	929	(6) 100.0%

Table SSR65 Most Used Glenoid Prostheses in Primary Total Stemless Anatomic Shoulder Replacement

2011		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
2	Aequalis	349	Affinis	365	Affinis	435	Affinis	441	Affinis
1	Affinis	202	Perform	216	Perform	266	Perform	287	Perform
1	Comprehensive	51	Comprehensive	72	Global	104	Global	89	Global
1	TESS	50	Global	37	Comprehensive	36	Comprehensive	44	Comprehensive
		6	Alliance	19	Equinoxe	25	Equinoxe	43	Equinoxe
		6	Equinoxe	11	Alliance	14	Alliance	22	Alliance
		4	SMR	4	SMR L1	2	SMR	3	SMR
		2	SMR L1	2	SMR	2	SMR L1		
		1	Custom Made (Comprehensive)						
Most Used									
5	(4) 100.0%	671	(9) 100.0%	726	(8) 100.0%	884	(8) 100.0%	929	(7) 100.0%

OUTCOME FOR ALL DIAGNOSES

Primary Diagnosis

The usage and availability of prostheses change with time, reflecting design change and surgeon preference. In order to keep Registry data contemporaneous, only procedures utilising prostheses that have been available and used in 2024 (described as modern prostheses) are included in the analyses, unless clearly specified.

At 10 years, the cumulative percent revision for primary total stemless anatomic shoulder replacement undertaken for osteoarthritis is 5.2%.

The most common diagnosis for primary total stemless shoulder replacement is osteoarthritis. There is no difference in the rate of revision when osteonecrosis is compared to osteoarthritis. The number of procedures undertaken for other diagnoses is small (Table SSR66).

Reason for Revision

The main reasons for revision are instability/dislocation, rotator cuff insufficiency, loosening and infection (Table SSR67 and Figure SSR48). Males have a higher cumulative incidence of rotator cuff insufficiency after 7 years, whereas females have a higher cumulative incidence of instability/dislocation. Compared to 2016, instability/dislocation has increased by 37.9%, and loosening by 16.7%, while infection decreased by 27.3%, and rotator cuff insufficiency reduced by 18.2%.

Type of Revision

The most common types of revision involve replacement of both the humeral and glenoid components (Table SSR68). Overall, 89.7% of total stemless anatomic shoulder replacements are revised to a total reverse shoulder replacement. A humeral/glenoid 1st revision has increased in proportion by 3.0% and humeral alone revisions have reduced in proportion by 9.1% since 2016.

Prosthesis Types

The outcomes of humeral stem and glenoid prosthesis combinations with >30 procedures used in primary total stemless anatomic shoulder replacement are listed in Table SSR69.

Table SSR66 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Primary Diagnosis**

Primary Diagnosis	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	161	5318	1.5 (1.2, 1.9)	3.3 (2.8, 3.9)	4.0 (3.4, 4.7)	4.4 (3.7, 5.2)	5.2 (4.1, 6.5)	
Osteonecrosis	6	97	1.1 (0.2, 7.6)	5.3 (2.0, 13.7)	10.0 (4.4, 21.6)	10.0 (4.4, 21.6)		
Other (5)	5	132	4.0 (1.7, 9.4)	4.0 (1.7, 9.4)	4.0 (1.7, 9.4)			
TOTAL	**172**	**5547**						

Note: Restricted to modern prostheses
Only primary diagnoses with >50 procedures have been listed
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR67 **Primary Total Stemless Anatomic Shoulder Replacement by Reason for Revision (All Diagnoses)**

Reason for Revision	Number	Percent
Instability/Dislocation	60	34.9
Rotator Cuff Insufficiency	44	25.6
Loosening	28	16.3
Infection	24	14.0
Pain	6	3.5
Fracture	3	1.7
Lysis	2	1.2
Arthrofibrosis	2	1.2
Malposition	2	1.2
Other	1	0.6
TOTAL	**172**	**100.0**

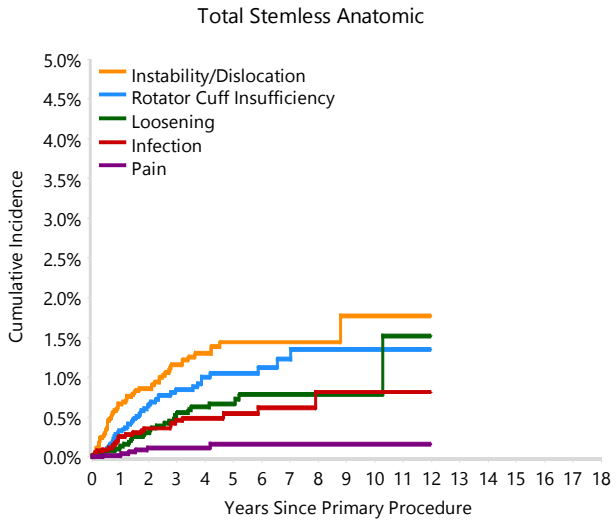
Note: Restricted to modern prostheses

Table SSR68 **Primary Total Stemless Anatomic Shoulder Replacement by Type of Revision (All Diagnoses)**

Type of Revision	Number	Percent
Humeral/Glenoid	138	80.2
Cement Spacer	12	7.0
Head Only	11	6.4
Humeral Component	7	4.1
Removal of Prostheses	2	1.2
Cement Only	1	0.6
Reoperation	1	0.6
TOTAL	**172**	**100.0**

Note: Restricted to modern prostheses

Figure SSR48 **Cumulative Incidence Revision Diagnosis of Primary Total Stemless Anatomic Shoulder Replacement (All Diagnoses)**



Note: Restricted to modern prostheses

Table SSR69 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Prosthesis Combination

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Affinis	Affinis	114	3253	1.6 (1.2, 2.1)	3.6 (3.0, 4.4)	4.3 (3.5, 5.2)	4.6 (3.8, 5.5)	5.3 (4.2, 6.7)	
	Global	1	184	0.6 (0.1, 4.2)	0.6 (0.1, 4.2)				
Comprehensive	Alliance	0	53	0.0 (0.0, 0.0)					
	Comprehensive	24	321	4.9 (3.0, 8.0)	7.5 (4.9, 11.4)	9.5 (6.3, 14.1)			
Equinoxe	Equinoxe	2	95	0.0 (0.0, 0.0)					
Global Icon	Global	3	226	1.1 (0.3, 4.2)	2.1 (0.6, 6.8)				
SMR	SMR	6	59	3.5 (0.9, 13.2)	8.9 (3.8, 20.0)	8.9 (3.8, 20.0)	13.4 (5.7, 29.8)		
Simpliciti	Perform	22	1350	0.9 (0.5, 1.6)	1.7 (1.0, 2.7)	2.6 (1.6, 4.2)			
Other (3)		0	6	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)				
TOTAL		**172**	**5547**						

Note: Restricted to modern prostheses. Only prostheses with >30 procedures have been listed

OUTCOME FOR OSTEOARTHRITIS – PATIENT CHARACTERISTICS

There are 5,318 (95.9%) primary total stemless anatomic shoulder replacement procedures with a primary diagnosis of osteoarthritis.

The cumulative percent revision of primary total stemless anatomic shoulder replacement for osteoarthritis at 10 years is 5.2% (Table SSR70).

The main reasons for revision are instability/dislocation (34.2%), rotator cuff insufficiency (25.5%), loosening (17.4%) and infection (14.3%) (Table SSR71 and Figure SSR49). The most common types of revision involve replacement of both the humeral and glenoid component with 93.8% being revised to a total stemmed reverse shoulder replacement (Table SSR72).

Age and Gender

Females have a higher rate of revision for total stemless anatomic shoulder replacement compared to males (Table SSR73 and Figure SSR50). Males are more commonly revised for rotator cuff insufficiency after 7 years and females for instability/dislocation (Figure SSR51).

Age alone is not a risk factor for revision (Table SSR73).

When gender is stratified by age, younger males have higher rates of revision compared males aged 65-74 years (Table SSR73 and Figure SSR52). There is no difference in the risk of revision risk for females.

The rate of revision is higher for females compared to males for osteoarthritis.

ASA and BMI

Most patients have an ASA score of 2 or 3. The cumulative percent revision at 7 years is 4.1% for ASA 2 patients and 5.3% for ASA 3 patients (Table SSR74). ASA score is not a risk factor for revision.

The most common BMI categories are pre-obese and obese class 1. BMI is not a risk factor for revision (Table SSR75). However, when BMI is stratified by gender, obese females have a higher rate of revision than obese males (Table SSR76 and Figure SSR53).

Glenoid Morphology

Glenoid morphology is not a risk factor for revision (Table SSR77).

Table SSR70 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement (Primary Diagnosis OA)

Shoulder Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemless Anatomic	161	5318	1.5 (1.2, 1.9)	3.3 (2.8, 3.9)	4.0 (3.4, 4.7)	4.4 (3.7, 5.2)	5.2 (4.1, 6.5)	
TOTAL	**161**	**5318**						

Note: Restricted to modern prostheses

Table SSR71 **Primary Total Stemless Anatomic Shoulder Replacement by Reason for Revision (Primary Diagnosis OA)**

Reason for Revision	Number	Percent
Instability/Dislocation	55	34.2
Rotator Cuff Insufficiency	41	25.5
Loosening	28	17.4
Infection	23	14.3
Pain	5	3.1
Fracture	3	1.9
Lysis	2	1.2
Arthrofibrosis	2	1.2
Malposition	2	1.2
TOTAL	**161**	**100.0**

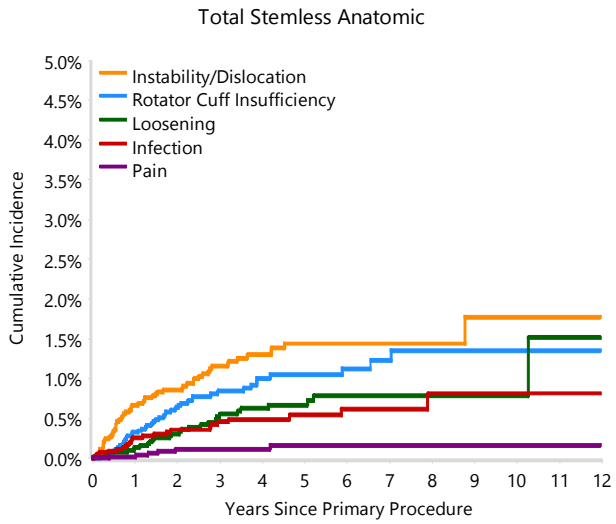
Note: Restricted to modern prostheses

Table SSR72 **Primary Total Stemless Anatomic Shoulder Replacement by Type of Revision (Primary Diagnosis OA)**

Type of Revision	Number	Percent
Humeral/Glenoid	130	80.7
Head Only	11	6.8
Cement Spacer	11	6.8
Humeral Component	7	4.3
Cement Only	1	0.6
Removal of Prostheses	1	0.6
TOTAL	**161**	**100.0**

Note: Restricted to modern prostheses

Figure SSR49 **Cumulative Incidence Revision Diagnosis of Primary Total Stemless Anatomic Shoulder Replacement (Primary Diagnosis OA)**



Note: Restricted to modern prostheses

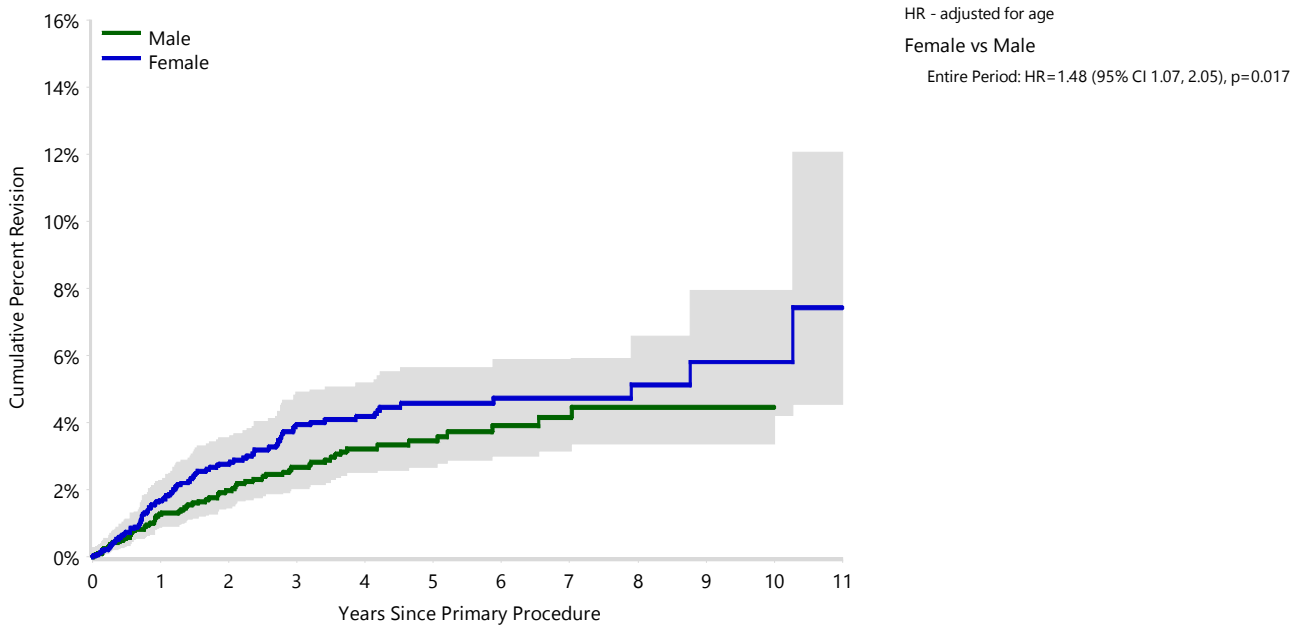
Table SSR73 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Age and Gender (Primary Diagnosis OA)

Gender	Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male		**70**	**2699**	**1.3 (0.9, 1.8)**	**2.7 (2.0, 3.5)**	**3.4 (2.7, 4.4)**	**4.2 (3.2, 5.4)**	**4.5 (3.4, 5.9)**	
	<65	41	1322	1.4 (0.8, 2.2)	3.2 (2.2, 4.6)	4.4 (3.2, 6.1)	5.6 (3.9, 8.0)		
	≥65	29	1377	1.2 (0.7, 2.0)	2.2 (1.5, 3.2)	2.6 (1.7, 3.8)	2.8 (1.9, 4.2)		
Female		**91**	**2619**	**1.7 (1.2, 2.3)**	**3.9 (3.2, 4.9)**	**4.6 (3.7, 5.7)**	**4.7 (3.8, 5.9)**	**5.8 (4.2, 8.0)**	
	<65	28	733	1.6 (0.8, 2.9)	4.8 (3.2, 7.1)	5.5 (3.8, 8.1)	5.5 (3.8, 8.1)		
	≥65	63	1886	1.7 (1.2, 2.5)	3.6 (2.8, 4.7)	4.2 (3.3, 5.5)	4.4 (3.4, 5.8)	5.3 (3.6, 7.7)	
TOTAL		**161**	**5318**						

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

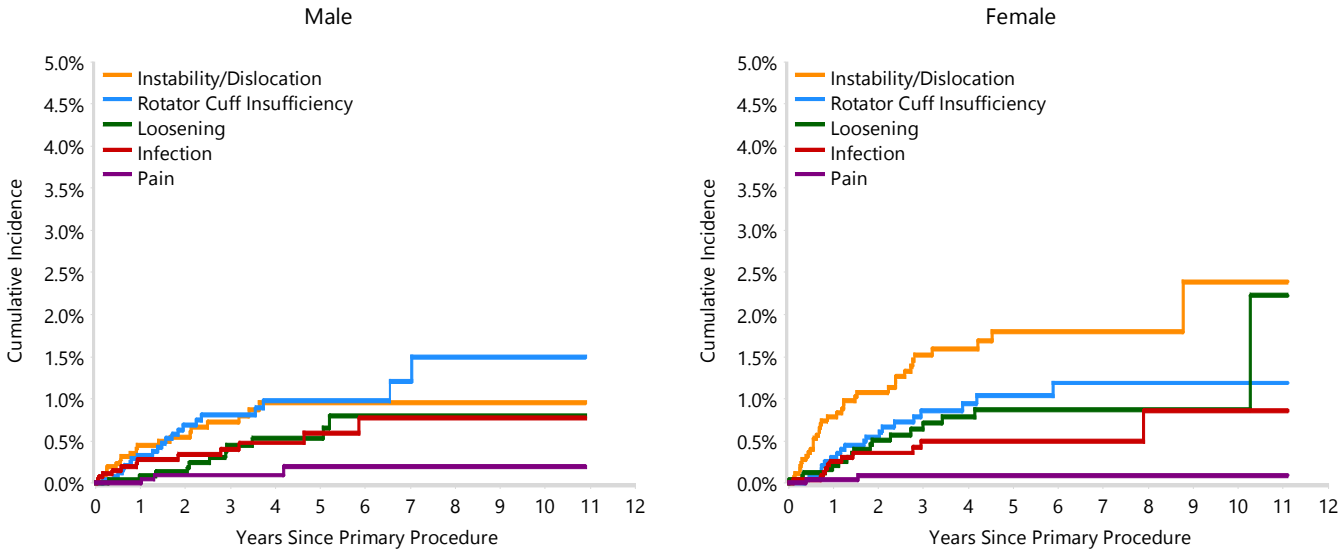
Figure SSR50 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	2699	2201	1367	722	314	49	0
Female	2619	2144	1375	806	377	67	0

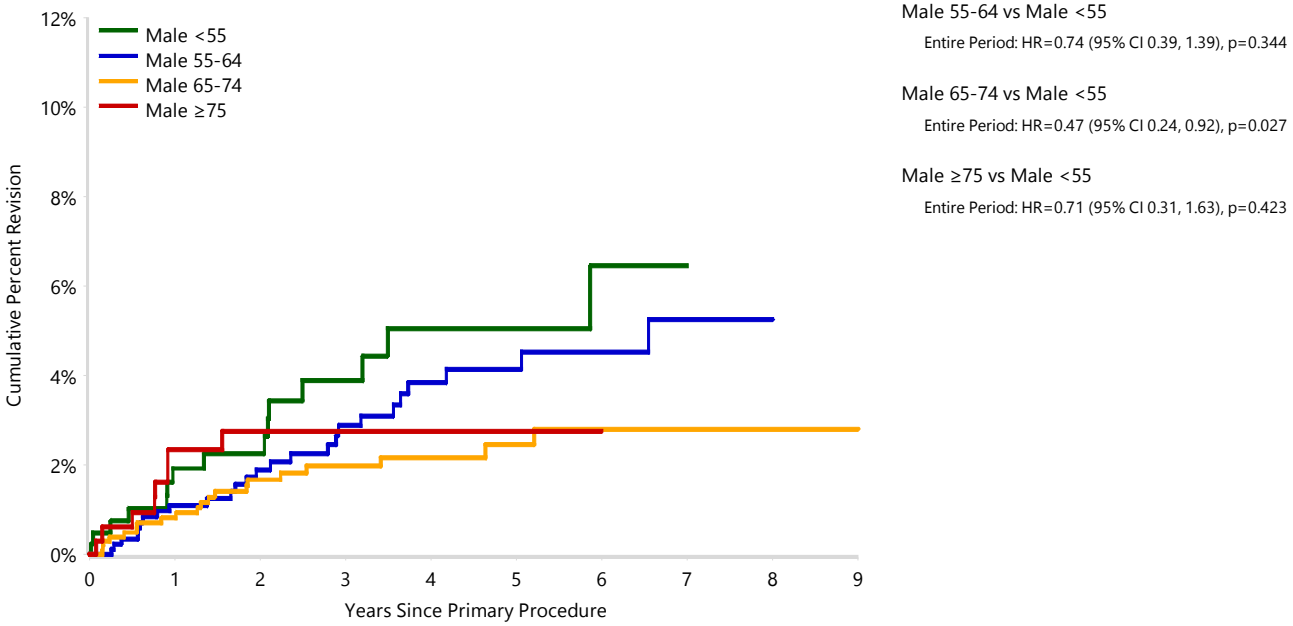
Note: Restricted to modern prostheses

Figure SSR51 **Cumulative Incidence Revision Diagnosis of Primary Total Stemless Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**



Note: Restricted to modern prostheses

Figure SSR52 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement in Males by Age (Primary Diagnosis OA)**



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	<55	412	321	185	90	45	5	0
	55-64	910	734	464	250	104	15	0
	65-74	1044	881	556	302	132	22	0
	≥75	333	265	162	80	33	7	0

Note: Restricted to modern prostheses

Table SSR74 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by ASA Score (Primary Diagnosis OA)

ASA Score	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs
ASA 1	8	361	0.9 (0.3, 2.8)	1.6 (0.7, 3.8)	2.4 (1.1, 5.0)	2.9 (1.4, 5.7)	2.9 (1.4, 5.7)	
ASA 2	70	2600	1.2 (0.8, 1.7)	2.3 (1.7, 3.0)	3.0 (2.3, 3.9)	3.8 (2.9, 4.8)	4.1 (3.2, 5.3)	4.1 (3.2, 5.3)
ASA 3	79	2201	1.9 (1.4, 2.6)	2.7 (2.0, 3.5)	3.9 (3.1, 5.0)	4.7 (3.7, 6.0)	5.3 (4.2, 6.8)	6.3 (4.7, 8.6)
ASA 4	2	56	3.8 (1.0, 14.5)	3.8 (1.0, 14.5)	3.8 (1.0, 14.5)	3.8 (1.0, 14.5)		
TOTAL	**159**	**5218**						

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR75 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by BMI Category (Primary Diagnosis OA)

BMI Category	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Underweight	0	16	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Normal	19	697	1.1 (0.5, 2.3)	2.6 (1.6, 4.3)	3.1 (1.9, 5.0)	3.1 (1.9, 5.0)	3.5 (2.2, 5.6)	3.5 (2.2, 5.6)
Pre Obese	45	1758	1.1 (0.7, 1.8)	1.8 (1.3, 2.7)	2.9 (2.1, 4.0)	3.4 (2.5, 4.6)	3.7 (2.7, 5.0)	4.0 (2.9, 5.5)
Obese Class 1	51	1487	1.6 (1.0, 2.4)	2.7 (2.0, 3.8)	3.7 (2.7, 5.0)	4.3 (3.2, 5.8)	4.7 (3.5, 6.3)	5.3 (3.9, 7.2)
Obese Class 2	27	715	2.6 (1.6, 4.1)	3.4 (2.2, 5.1)	4.3 (2.9, 6.4)	4.3 (2.9, 6.4)	4.7 (3.2, 7.0)	5.2 (3.5, 7.8)
Obese Class 3	9	365	1.5 (0.6, 3.6)	1.5 (0.6, 3.6)	2.9 (1.4, 5.9)	3.5 (1.8, 6.8)	3.5 (1.8, 6.8)	3.5 (1.8, 6.8)
TOTAL	**151**	**5038**						

Note: Restricted to modern prostheses

BMI has not been presented for patients aged ≤19 years

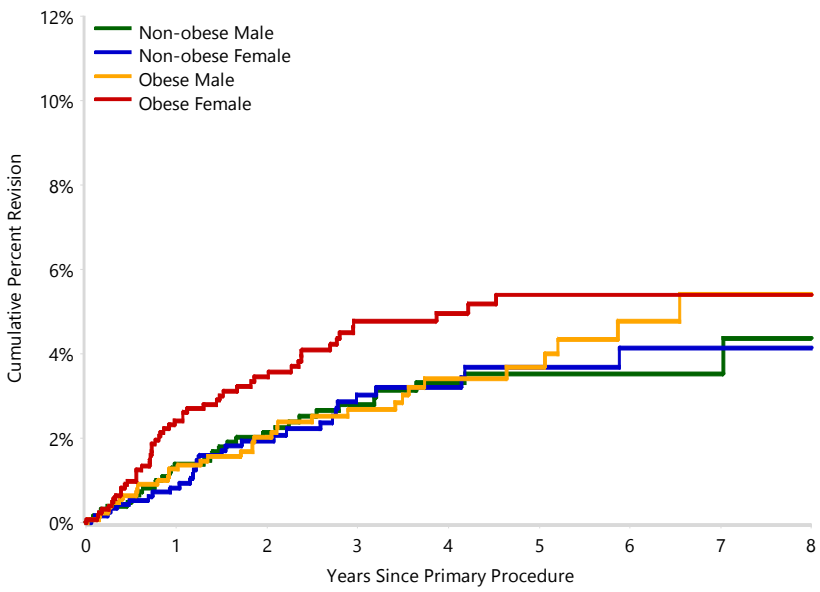
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR76 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by BMI Category and Gender (Primary Diagnosis OA)**

BMI Category	Gender	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Non-obese	Male	33	1281	1.4 (0.9, 2.3)	2.1 (1.4, 3.2)	2.8 (1.9, 4.1)	3.3 (2.3, 4.7)	3.5 (2.5, 5.0)	3.5 (2.5, 5.0)
	Female	31	1190	0.8 (0.4, 1.6)	1.9 (1.2, 3.0)	3.0 (2.1, 4.5)	3.2 (2.2, 4.7)	3.7 (2.5, 5.4)	4.1 (2.8, 6.1)
Obese	Male	36	1298	1.3 (0.8, 2.1)	2.0 (1.3, 3.1)	2.7 (1.8, 3.9)	3.4 (2.4, 4.9)	3.7 (2.6, 5.3)	4.8 (3.3, 7.0)
	Female	51	1269	2.4 (1.7, 3.5)	3.5 (2.5, 4.7)	4.8 (3.6, 6.3)	5.0 (3.7, 6.6)	5.4 (4.1, 7.1)	5.4 (4.1, 7.1)
TOTAL		**151**	**5038**						

Note: Restricted to modern prostheses
BMI has not been presented for patients aged ≤19 years
Non-obese group includes underweight, normal and pre-obese
Obese group includes obese class 1, 2 and 3

Figure SSR53 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by BMI Category and Gender (Primary Diagnosis OA)**



HR - adjusted for age

Non-obese Male vs Non-obese Female
Entire Period: HR=0.87 (95% CI 0.53, 1.44), p=0.598

Non-obese Male vs Obese Male
Entire Period: HR=0.96 (95% CI 0.60, 1.54), p=0.872

Non-obese Female vs Obese Female
Entire Period: HR=0.71 (95% CI 0.45, 1.11), p=0.129

Obese Male vs Obese Female
Entire Period: HR=0.64 (95% CI 0.42, 0.99), p=0.046

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Non-obese	Male	1281	1034	809	638	477	312	204
	Female	1190	953	736	570	435	314	203
Obese	Male	1298	1050	831	620	453	313	204
	Female	1269	1038	822	662	504	365	239

Note: Restricted to modern prostheses
BMI has not been presented for patients aged ≤19 years
Non-obese group includes underweight, normal and pre-obese
Obese group includes obese class 1, 2 and 3

Table SSR77 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Glenoid Morphology (Primary Diagnosis OA)

Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
A1	43	1665	1.2 (0.8, 1.9)	1.9 (1.3, 2.8)	3.0 (2.1, 4.2)	3.3 (2.4, 4.7)	4.2 (3.0, 5.8)
A2	29	820	2.2 (1.4, 3.6)	3.0 (2.0, 4.6)	4.1 (2.8, 5.9)	4.4 (3.0, 6.3)	4.7 (3.2, 6.9)
B1	23	945	1.3 (0.7, 2.3)	2.1 (1.3, 3.4)	3.0 (2.0, 4.6)	3.3 (2.2, 5.0)	3.3 (2.2, 5.0)
B2	21	847	1.1 (0.5, 2.2)	2.0 (1.1, 3.4)	2.8 (1.7, 4.6)	3.5 (2.2, 5.5)	3.5 (2.2, 5.5)
C	2	113	1.2 (0.2, 8.1)	2.4 (0.6, 9.1)	2.4 (0.6, 9.1)		
TOTAL	**118**	**4390**					

Note: Restricted to modern prostheses

Excludes 17 procedures where a glenoid morphology of B3 was recorded

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OUTCOME FOR OSTEOARTHRITIS – PROSTHESIS CHARACTERISTICS

Fixation

The majority of primary total stemless anatomic shoulder replacement procedures utilise hybrid (cementless humeral component with a cemented glenoid) fixation. Cemented primary stemless anatomic prostheses have a higher revision rate than hybrid fixation procedures (Table SSR78 and Figure SSR54).

Glenoid Types

There are four types of glenoids: all with polyethylene bearing surface but differing methods of fixation to bone. Non- modular metal back glenoids have a polyethylene bearing surface with backside integrated metallic coating. Hybrid metal/polyethylene glenoids have a polyethylene bearing surface and one or more metallic fixation pegs. Cemented polyethylene glenoids with a modified central peg are all polyethylene but the central peg is further engineered for additional fixation to bone. All polyethylene glenoids are polyethylene fixed by cemented pegs or keels alone without further fixation features.

Cemented all polyethylene glenoids are the most common type of glenoid used (Table SSR79). Non modular metal backed glenoids have a higher risk of revision than both cemented all polyethylene glenoids and modified central peg glenoids (Figure SSR55).

Bearing Surface

There is no difference in the rate of revision when ceramic/non XLPE, ceramic/XLPE, metal/XLPE and metal/non XLPE bearing surfaces (humeral head/glenoid) are compared (Table SSR80).

Humeral Heads

Humeral head size is not a risk factor for revision of primary total stemless anatomic shoulder replacement (Table SSR81).

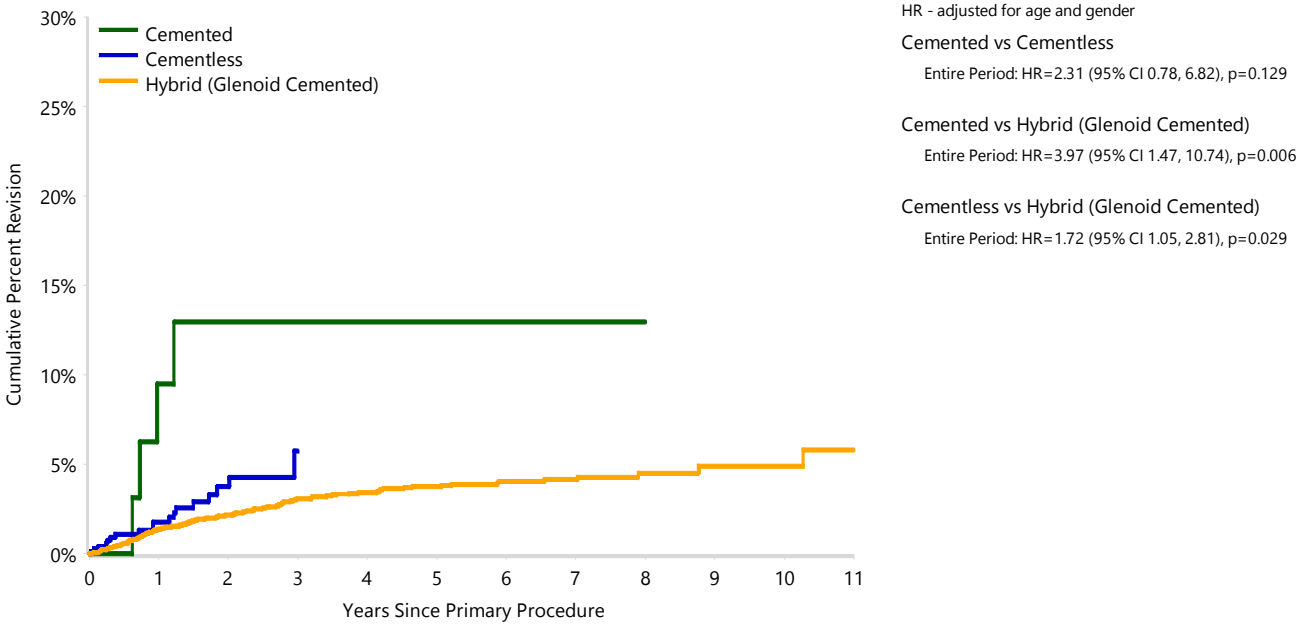
Humeral head size is not a risk factor for revision of primary total stemless anatomic shoulder

Table SSR78 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Fixation (Primary Diagnosis OA)**

Fixation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented	4	34	9.5 (3.2, 26.6)	13.0 (5.1, 31.0)	13.0 (5.1, 31.0)	13.0 (5.1, 31.0)		
Cementless	19	708	1.8 (1.0, 3.3)	5.7 (3.1, 10.6)				
Hybrid (Glenoid Cemented)	138	4576	1.4 (1.1, 1.8)	3.1 (2.5, 3.7)	3.7 (3.1, 4.4)	4.2 (3.5, 5.0)	4.9 (3.9, 6.3)	
TOTAL	**161**	**5318**						

Note: Restricted to modern prostheses

Figure SSR54 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Fixation (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented	34	28	19	10	7	0	0
Cementless	708	407	64	0	0	0	0
Hybrid (Glenoid Cemented)	4576	3910	2659	1518	684	116	0

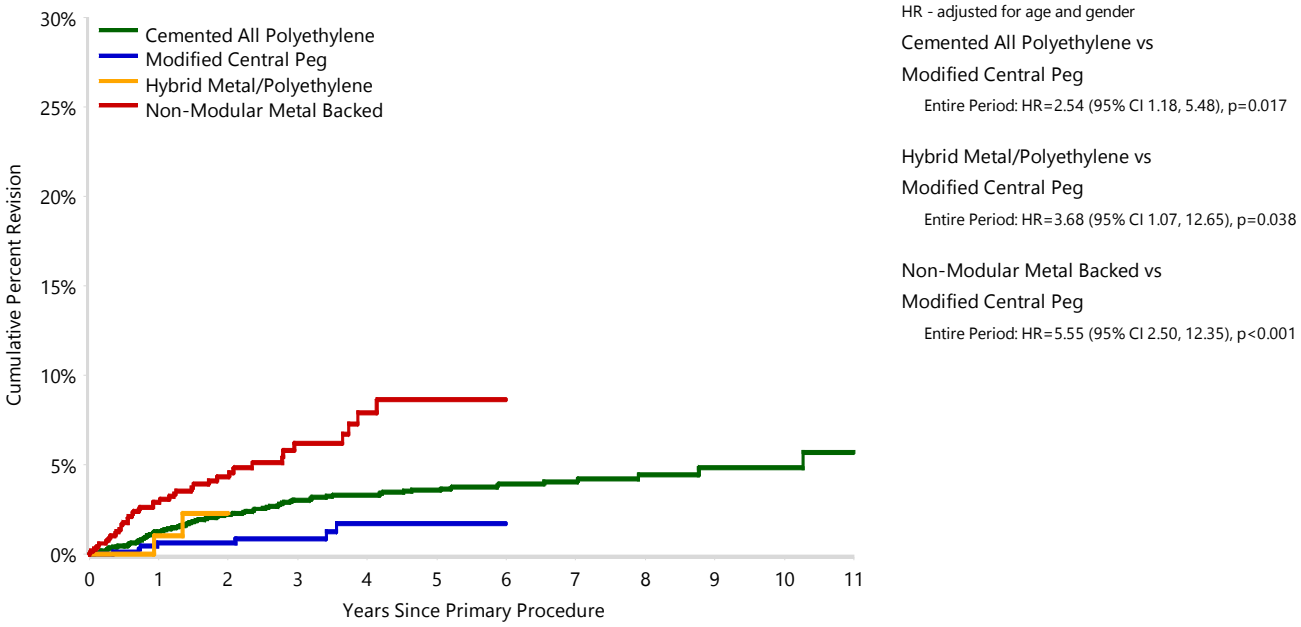
Note: Restricted to modern prostheses

Table SSR79 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Glenoid Type (Primary Diagnosis OA)

Glenoid Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented All Polyethylene	107	3367	1.3 (0.9, 1.7)	3.0 (2.5, 3.8)	3.6 (2.9, 4.4)	4.1 (3.3, 5.0)	4.8 (3.7, 6.2)	
Modified Central Peg	7	782	0.6 (0.2, 1.7)	0.9 (0.4, 2.1)	1.7 (0.8, 3.9)			
Hybrid Metal/Polyethylene	4	154	1.0 (0.1, 7.1)					
Non-Modular Metal Backed	43	1015	2.9 (2.0, 4.3)	6.2 (4.4, 8.7)	8.6 (6.0, 12.4)			
TOTAL	**161**	**5318**						

Note: Restricted to modern prostheses

Figure SSR55 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Glenoid Type (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented All Polyethylene	3367	3005	2206	1322	661	116	0
Modified Central Peg	782	587	272	105	3	0	0
Hybrid Metal/Polyethylene	154	93	25	3	0	0	0
Non-Modular Metal Backed	1015	660	239	98	27	0	0

Note: Restricted to modern prostheses

Table SSR80 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Bearing Surface (Primary Diagnosis OA)

Bearing Surface	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Ceramic/Non XLPE	27	523	1.2 (0.5, 2.5)	3.7 (2.4, 5.7)	4.5 (3.0, 6.6)	5.1 (3.5, 7.4)	5.1 (3.5, 7.4)	
Ceramic/XLPE	80	2759	1.5 (1.1, 2.0)	3.3 (2.6, 4.2)	3.8 (3.1, 4.8)	3.8 (3.1, 4.8)		
Metal/Non XLPE	48	1776	1.6 (1.1, 2.4)	3.1 (2.3, 4.3)	4.2 (3.1, 5.7)	4.6 (3.3, 6.3)		
Metal/XLPE	6	260	1.3 (0.4, 4.1)	2.7 (1.1, 6.4)	2.7 (1.1, 6.4)			
TOTAL	**161**	**5318**						

Note: Restricted to modern prostheses. Reported as humeral head/glenoid

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR81 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Humeral Head Size (Primary Diagnosis OA)

Humeral Head Size	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<44mm	62	1655	1.7 (1.2, 2.5)	4.4 (3.4, 5.7)	4.6 (3.6, 6.0)	4.9 (3.7, 6.3)	6.2 (4.3, 9.1)	
44-50mm	70	2688	1.3 (0.9, 1.8)	2.8 (2.2, 3.6)	3.6 (2.8, 4.6)	3.8 (3.0, 4.9)	4.1 (3.2, 5.4)	
>50mm	29	970	1.5 (0.9, 2.6)	2.9 (1.9, 4.4)	4.2 (2.8, 6.3)	5.5 (3.5, 8.6)		
TOTAL	**161**	**5313**						

Note: Restricted to modern prostheses

Excludes 5 procedures with unknown head size

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

IMPLANT SIZING VARIATIONS (ISV)

ISV are modifications to a prosthesis design range beyond simple size change.

Glenoid Augmentation

A glenoid component is categorised as augmented if the backside has been modified for glenoid deformity (e.g. wedged, stepped, angulated, or lateralised). Augmented glenoids are not a revision risk factor (Table SSR82). When stratified by glenoid morphology there continued to be no difference in revision rates between augmented and non-augmented glenoids (Table SSR83).

Table SSR82 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Glenoid Augmentation (Primary Diagnosis OA, Excluding Modular Metal Backed Glenoids)

Glenoid Augmentation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Augmented	2	163	0.0 (0.0, 0.0)	1.9 (0.5, 7.6)				
Non-augmented	159	5141	1.5 (1.2, 1.9)	3.3 (2.8, 4.0)	4.0 (3.4, 4.8)	4.5 (3.8, 5.3)	5.2 (4.2, 6.5)	
TOTAL	**161**	**5304**						

Note: Excludes 941 procedures with unknown glenoid augmentation or glenoid morphology. Restricted to modern prostheses. Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR83 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Glenoid Morphology and Glenoid Augmentation (Primary Diagnosis OA, Excluding Modular Metal Backed Glenoids)

Glenoid Morphology	Glenoid Augmentation	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
A	Augmented	0	10	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
	Non-augmented	72	2469	1.6 (1.1, 2.2)	2.3 (1.7, 3.0)	3.4 (2.6, 4.3)	3.7 (2.9, 4.7)	4.4 (3.4, 5.6)
B	Augmented	2	129	0.0 (0.0, 0.0)	1.1 (0.2, 7.4)	2.5 (0.6, 9.7)		
	Non-augmented	42	1658	1.3 (0.8, 2.0)	2.1 (1.5, 3.0)	3.0 (2.1, 4.1)	3.4 (2.5, 4.7)	3.4 (2.5, 4.7)
C	Augmented	0	12	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
	Non-augmented	2	99	1.4 (0.2, 9.2)	2.7 (0.7, 10.4)	2.7 (0.7, 10.4)	2.7 (0.7, 10.4)	2.7 (0.7, 10.4)
TOTAL		**118**	**4377**					

Note: Excludes 941 procedures with unknown glenoid augmentation or glenoid morphology. Restricted to modern prostheses. Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

SURGEON ASSISTIVE TOOLS

An image derived instrument (IDI) is defined as custom made pin guides or cutting blocks derived from CT or MRI images by 3D printing specifically for each patient. There are 1,643 total stemless anatomic shoulder replacements for osteoarthritis utilising an IDI since their first use in 2016. In 2024, IDI are used in 46.7% of all total stemless anatomic shoulder replacement procedures.

There is no difference in the rate of revision when IDI is used compared to when IDI is not used (Table SSR84).

When stratified by glenoid morphology, the use of an IDI increases the rate of revision for glenoid morphology class A. There is no difference in revision rates for glenoid morphology class B. There are insufficient numbers to analyse IDI usage in glenoid morphology class C (Table SSR85, Table SSR86, Figure SSR56 and Table SSR87).

Table SSR84 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement Since 2016 by IDI Usage (Primary Diagnosis OA)

IDI Use	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
IDI Used	51	1734	1.9 (1.3, 2.7)	3.0 (2.2, 4.1)	4.3 (3.3, 5.8)	4.3 (3.3, 5.8)	
Traditional Instrumentation	95	3331	1.3 (0.9, 1.7)	2.0 (1.5, 2.6)	2.7 (2.2, 3.4)	3.6 (2.9, 4.4)	4.2 (3.3, 5.2)
TOTAL	**146**	**5065**					

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR85 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement Since 2016 by IDI and Glenoid Morphology Usage (Primary Diagnosis OA)

IDI Use	Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
IDI Used		**49**	**1643**	**1.9 (1.3, 2.8)**	**3.0 (2.2, 4.2)**	**4.5 (3.3, 6.0)**	**4.5 (3.3, 6.0)**	
	A1	20	616	2.1 (1.2, 3.7)	3.3 (2.0, 5.4)	5.2 (3.2, 8.2)	5.2 (3.2, 8.2)	
	A2	10	236	2.9 (1.3, 6.3)	3.5 (1.7, 7.2)	6.2 (3.3, 11.6)		
	B1	8	371	1.3 (0.5, 3.3)	2.5 (1.2, 5.3)	3.2 (1.6, 6.4)	3.2 (1.6, 6.4)	
	B2	10	382	1.6 (0.6, 3.7)	2.8 (1.4, 5.5)	3.7 (2.0, 6.8)	3.7 (2.0, 6.8)	
	C	1	38	4.5 (0.7, 28.1)	4.5 (0.7, 28.1)	4.5 (0.7, 28.1)		
Traditional Instrumentation		**69**	**2747**	**1.1 (0.8, 1.6)**	**1.7 (1.3, 2.3)**	**2.5 (1.9, 3.3)**	**3.5 (2.7, 4.5)**	**4.3 (3.3, 5.8)**
	A1	23	1049	0.7 (0.3, 1.5)	1.1 (0.6, 2.1)	2.0 (1.2, 3.3)	3.5 (2.2, 5.5)	5.0 (2.9, 8.4)
	A2	19	584	2.0 (1.1, 3.6)	2.9 (1.7, 4.7)	3.4 (2.1, 5.4)	4.2 (2.6, 6.7)	
	B1	15	574	1.3 (0.6, 2.7)	1.9 (1.0, 3.6)	3.0 (1.8, 5.0)	3.3 (2.0, 5.5)	
	B2	11	465	0.7 (0.2, 2.2)	1.3 (0.6, 3.2)	2.1 (1.0, 4.5)	3.1 (1.6, 6.1)	
	C	1	75	0.0 (0.0, 0.0)	1.6 (0.2, 10.9)	1.6 (0.2, 10.9)	1.6 (0.2, 10.9)	
TOTAL		**118**	**4390**					

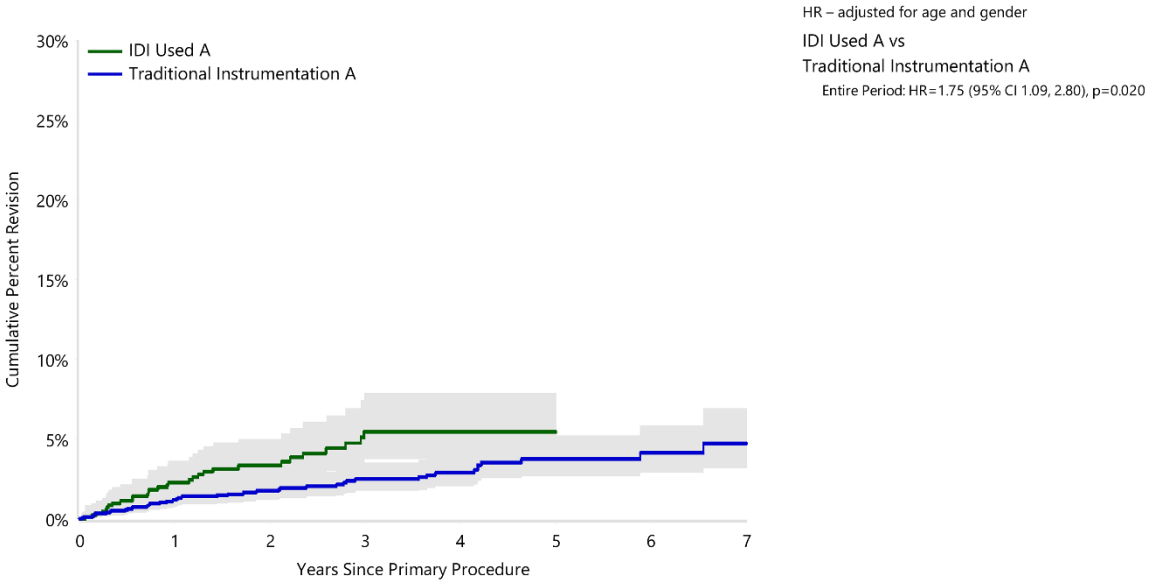
Note: Restricted to modern prostheses

Table SSR86 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement Since 2016 by IDI Usage and Glenoid Morphology (Primary Diagnosis OA)**

IDI Use	Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
IDI Used	A	30	852	2.3 (1.4, 3.7)	3.4 (2.2, 5.0)	5.5 (3.7, 7.9)	5.5 (3.7, 7.9)	
Traditional Instrumentation	A	42	1633	1.2 (0.8, 1.9)	1.7 (1.2, 2.6)	2.5 (1.8, 3.5)	3.8 (2.7, 5.2)	4.7 (3.2, 6.9)
TOTAL		**72**	**2485**					

Note: Restricted to modern prostheses

Figure SSR56 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement Since 2016 by IDI Usage and Glenoid Morphology (Primary Diagnosis OA)**



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
IDI Used	A	852	631	429	268	93	8
Traditional Instrumentation	A	1633	1355	1064	840	405	102

Note: Restricted to modern prostheses

Table SSR87 **Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement Since 2016 by IDI Usage and Glenoid Morphology (Primary Diagnosis OA)**

IDI Use	Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
IDI Used	B	18	753	1.4 (0.7, 2.7)	2.7 (1.6, 4.4)	3.5 (2.2, 5.5)	3.5 (2.2, 5.5)	
Traditional Instrumentation	B	26	1039	1.0 (0.6, 1.9)	1.7 (1.0, 2.8)	2.6 (1.7, 4.0)	3.2 (2.1, 4.8)	3.9 (2.6, 6.0)
TOTAL		**44**	**1792**					

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OPERATIVE TECHNIQUE

Rotator Cuff Repair

A rotator cuff repair undertaken during the implantation of a primary total stemless anatomic shoulder replacement does not change the early rate of revision (Table SSR88).

The outcome of the most used primary total stemless anatomic prosthesis combinations >30 procedures are listed in Table SSR89.

Table SSR88 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Rotator Cuff Repair (Primary Diagnosis OA)

Rotator Cuff Repair	N Revised	N Total	1 Yr	3 Yrs	5 Yrs
Yes	11	607	1.6 (0.8, 3.4)	2.4 (1.2, 4.8)	
No	27	1418	1.4 (0.8, 2.3)	2.3 (1.6, 3.5)	3.6 (2.2, 5.7)
TOTAL	**38**	**2025**			

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR89 Cumulative Percent Revision of Primary Total Stemless Anatomic Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Affinis	Affinis	106	3101	1.5 (1.1, 2.0)	2.5 (2.0, 3.2)	3.5 (2.9, 4.4)	4.2 (3.4, 5.1)	4.5 (3.7, 5.5)
	Global	1	178	0.6 (0.1, 4.4)	0.6 (0.1, 4.4)	0.6 (0.1, 4.4)		
Comprehensive	Alliance	0	53	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
	Comprehensive	24	312	5.0 (3.1, 8.2)	5.8 (3.7, 9.2)	7.8 (5.1, 11.7)	9.8 (6.6, 14.6)	
Equinoxe	Equinoxe	2	86	0.0 (0.0, 0.0)	2.7 (0.4, 17.7)			
Global Icon	Global	3	219	1.1 (0.3, 4.3)	1.1 (0.3, 4.3)	2.2 (0.7, 7.1)		
SMR	SMR	5	57	3.6 (0.9, 13.5)	5.4 (1.8, 15.8)	7.2 (2.8, 18.2)	7.2 (2.8, 18.2)	11.9 (4.6, 28.8)
Simpliciti	Perform	20	1306	0.8 (0.4, 1.6)	1.4 (0.8, 2.3)	1.7 (1.0, 2.7)	2.3 (1.4, 3.7)	
Other (3)		0	6	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)		
TOTAL		**161**	**5318**					

Note: Restricted to modern prostheses.

Only prostheses with >30 procedures have been listed

Primary Total Stemmed Anatomic Shoulder Replacement

DEMOGRAPHICS

There are 16,893 total stemmed anatomic shoulder replacement procedures. This is an additional 374 procedures compared to the previous report.

The majority of procedures are undertaken in females. However, the proportion of males has increased 0.3% since 2016. The mean age of females is older than males (Table SSR90).

The majority of procedures are undertaken in the 65–74 year age group. The proportional use in patients aged ≥75 years has declined from 23.0% in 2022 to 19.4% in 2024.

Hybrid fixation with a cemented glenoid has increased from 55.8% in 2010 to 87.5% in 2024.

In 2024, non XLPE polyethylene is more commonly used (67.5%) in total stemmed anatomic replacement glenoids than XLPE (32.5%) (Figure SSR57).

The most common type of fixation is hybrid fixation (cementless humerus and cemented glenoid) (Figure SSR58).

The 10 most used humeral stem and glenoid prostheses are listed in Table SSR91 and Table SSR92.

Table SSR90 Age and Gender of Primary Total Stemmed Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	7284	43.1%	21	93	67	66.6	9.0
Female	9609	56.9%	19	96	71	70.2	8.5
TOTAL	**16893**	**100.0%**	**19**	**96**	**69**	**68.6**	**8.9**

Figure SSR57 Primary Total Stemmed Anatomic Shoulder Replacement by Polyethylene Type

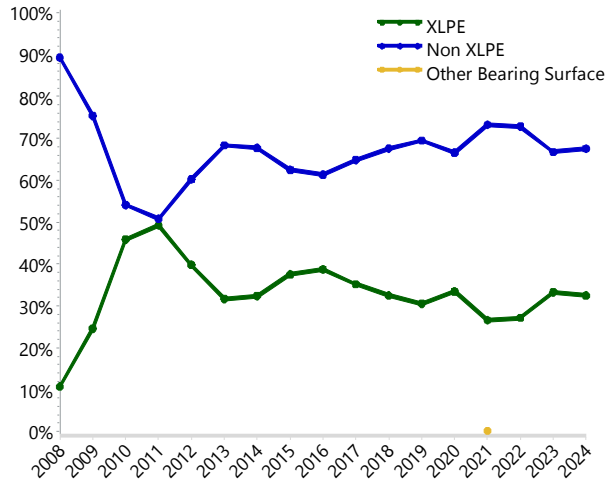


Figure SSR58 Primary Total Stemmed Anatomic Shoulder Replacement by Fixation

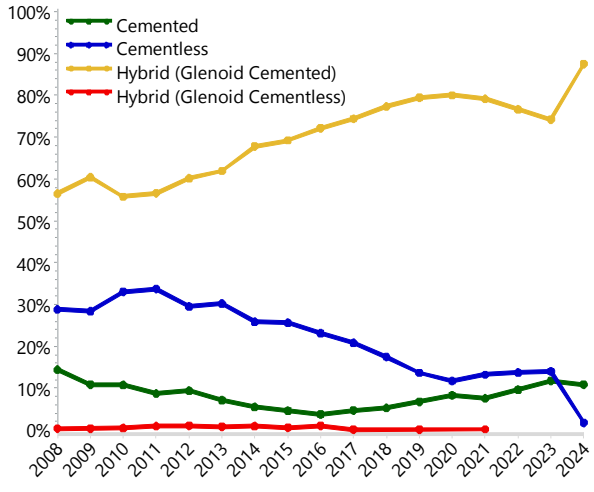


Table SSR91 Most Used Humeral Stem Prostheses in Primary Total Stemmed Anatomic Shoulder Replacement

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
298	SMR	179	Ascend Flex	186	Ascend Flex	158	Ascend Flex	129	Ascend Flex
167	Aequalis	92	Equinoxe	103	Global Unite	127	Global Unite	74	Global Unite
117	Global Advantage	92	Global Unite	86	Equinoxe	79	SMR	72	Comprehensive
91	Global AP	86	Comprehensive	77	SMR	62	Comprehensive	35	SMR
40	Bigliani/Flatow	83	SMR	71	Comprehensive	48	Equinoxe	23	Equinoxe
37	Bigliani/Flatow TM	56	Global AP	30	Global AP	23	Global AP	10	Affinis
32	Solar	4	Bigliani/Flatow TM	4	Affinis	1	Affinis	8	MSS
27	Affinis	3	Delta Xtend	2	Delta Xtend	1	Delta Xtend		
11	Univers 3D	2	Global Advantage	1	Bigliani/Flatow TM	1	MSS		
10	Cofield 2	1	Affinis						
10 Most Used									
830	(10) 97.9%	598	(10) 100.0%	560	(9) 100.0%	500	(9) 100.0%	351	(7) 100.0%
Remainder									
18	(7) 2.1%	0	(0) 0%	0	(0) 0%	0	(0) 0%	0	(0) 0%
TOTAL									
848	(17) 100.0%	598	(10) 100.0%	560	(9) 100.0%	500	(9) 100.0%	351	(7) 100.0%

Table SSR92 Most Used Glenoid Prostheses in Primary Total Stemmed Anatomic Shoulder Replacement

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
237	SMR L1	180	Perform	185	Perform	158	Perform	129	Perform
209	Global	151	Global	135	Global	151	Global	74	Global
167	Aequalis	92	Equinoxe	86	Equinoxe	65	SMR L1	55	Comprehensive
79	Bigliani/Flatow	73	Comprehensive	65	SMR L1	48	Comprehensive	35	SMR
57	SMR	70	SMR L1	61	Comprehensive	48	Equinoxe	23	Equinoxe
32	Solar	13	Alliance	12	SMR	14	Alliance	17	Alliance
27	Affinis	10	SMR	10	Alliance	14	SMR	10	Affinis
11	Univers 3D	3	Bigliani/Flatow	5	Affinis	1	Affinis	8	MSS
10	Cofield 2	2	SMR Axioma	1	Bigliani/Flatow	1	MSS		
7	Promos	1	Affinis						
10 Most Used									
836	(10) 98.6%	595	(10) 99.5%	560	(9) 100.0%	500	(9) 100.0%	351	(8) 100.0%
Remainder									
12	(6) 1.4%	3	(3) 0.5%	0	(0) 0%	0	(0) 0%	0	(0) 0%
TOTAL									
848	(16) 100.0%	598	(13) 100.0%	560	(9) 100.0%	500	(9) 100.0%	351	(8) 100.0%

OUTCOME FOR ALL DIAGNOSES

Primary Diagnosis

The usage and availability of prostheses change with time, reflecting design change and surgeon preference. In order to keep Registry data contemporaneous, only procedures utilising prostheses that have been available and used in 2024 (described as modern prostheses) are included in the analyses, unless clearly specified.

This year, modern prostheses do not include modular metal backed glenoids with total stemmed anatomic shoulder replacements.

The most common diagnosis for primary total stemmed anatomic shoulder replacement is osteoarthritis (94.6%) (Table SSR93). There is no difference in the rate of revision between osteoarthritis, osteonecrosis and rheumatoid arthritis (Table SSR94).

Reason for Revision

The main reasons for revision are loosening, rotator cuff insufficiency, and instability/dislocation (Table SSR95 and Figure SSR59). Since 2016, revision for instability/dislocation increased in proportion by 42.1%. In contrast, loosening decreased by 25%, rotator cuff insufficiency by 8.6% and infection by 7.1%. The predominant reason for revision for both males and females is loosening (Figure SSR60).

TYPE OF REVISION

The most common type of revision involves replacement of the humeral and glenoid components (75.3%) (Table SSR96). Since 2016, isolated humeral or glenoid component, and head only revisions decreased by 10.7%, 3.6%, and 7.1%, respectively. Humeral/glenoid revisions have increased by 21.4%.

The majority of total stemmed anatomic replacements are revised to reverse replacements (89.4%) with 56.3% retaining the humeral stem.

Table SSR93 Primary Total Stemmed Anatomic Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	5120	94.6
Osteonecrosis	103	1.9
Rheumatoid Arthritis	70	1.3
Fracture	35	0.6
Other Inflammatory Arthritis	32	0.6
Rotator Cuff Arthropathy	30	0.6
Instability	17	0.3
Tumour	6	0.1
TOTAL	**5413**	**100.0**

Table SSR94 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Osteoarthritis	268	5120	2.0 (1.6, 2.4)	3.0 (2.6, 3.6)	3.6 (3.1, 4.1)	4.7 (4.1, 5.4)	5.8 (5.1, 6.6)
Osteonecrosis	4	103	1.0 (0.1, 7.0)	3.5 (1.1, 10.5)	3.5 (1.1, 10.5)	5.3 (2.0, 13.9)	
Rheumatoid Arthritis	5	70	2.9 (0.7, 11.1)	4.4 (1.4, 13.1)	4.4 (1.4, 13.1)	6.3 (2.4, 15.9)	6.3 (2.4, 15.9)
Fracture	5	35	3.1 (0.4, 20.2)	13.4 (5.2, 32.0)	17.0 (7.4, 36.3)	17.0 (7.4, 36.3)	17.0 (7.4, 36.3)
Other Inflammatory Arthritis	4	32	3.1 (0.4, 20.2)	3.1 (0.4, 20.2)	7.0 (1.8, 25.4)	11.7 (3.8, 32.4)	11.7 (3.8, 32.4)
Rotator Cuff Arthropathy	1	30	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	10.0 (1.5, 52.7)
Other (2)	1	23	0.0 (0.0, 0.0)	5.9 (0.9, 35.0)	5.9 (0.9, 35.0)	5.9 (0.9, 35.0)	5.9 (0.9, 35.0)
TOTAL	**288**	**5413**					

Note: Only primary diagnoses with >30 procedures have been listed

Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR95 **Primary Total Stemmed Anatomic Shoulder Replacement by Reason for Revision (All Diagnoses)**

Reason for Revision	Number	Percent
Loosening	82	28.5
Rotator Cuff Insufficiency	81	28.1
Instability/Dislocation	64	22.2
Infection	14	4.9
Pain	12	4.2
Fracture	8	2.8
Lysis	6	2.1
Incorrect Sizing	5	1.7
Arthrofibrosis	4	1.4
Implant Breakage Glenoid	4	1.4
Malposition	3	1.0
Implant Breakage Glenoid Insert	1	0.3
Dissociation	1	0.3
Wear Glenoid Insert	1	0.3
Other	2	0.7
TOTAL	**288**	**100.0**

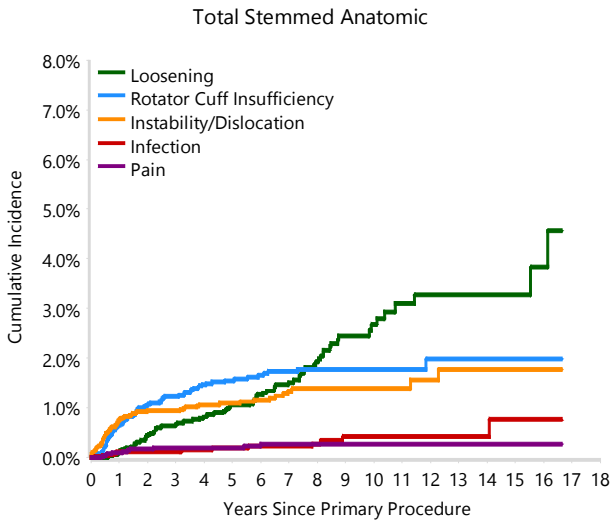
Note: Restricted to modern prostheses

Table SSR96 **Primary Total Stemmed Anatomic Shoulder Replacement by Type of Revision (All Diagnoses)**

Type of Revision	Number	Percent
Humeral/Glenoid	217	75.3
Head Only	29	10.1
Glenoid Component	14	4.9
Humeral Component	14	4.9
Cement Spacer	11	3.8
Removal of Prostheses	2	0.7
Reoperation	1	0.3
TOTAL	**288**	**100.0**

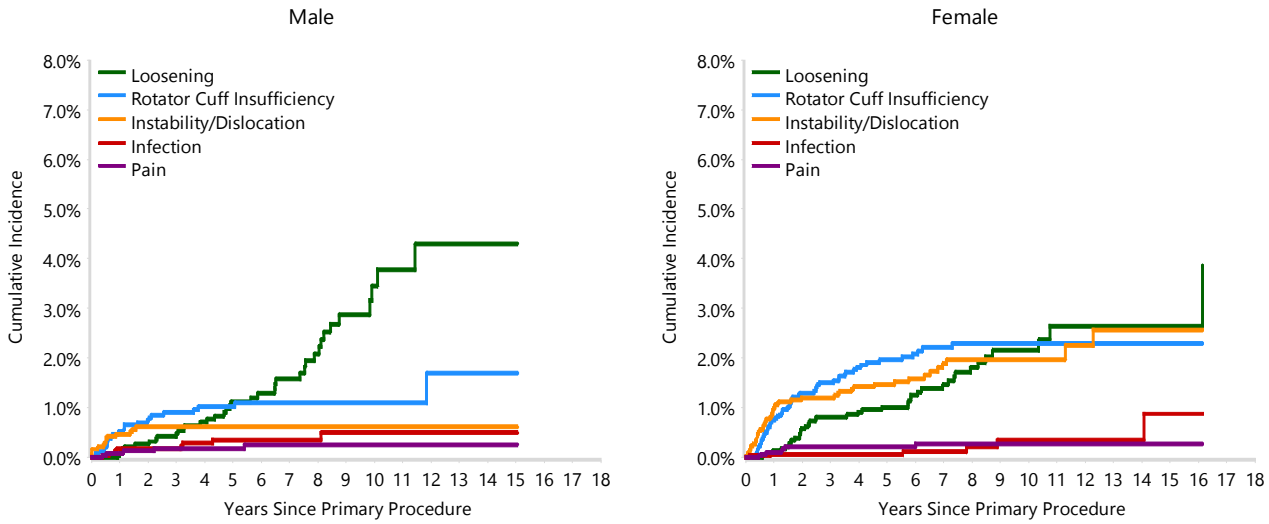
Note: Restricted to modern prostheses
Humeral heads are replaced when the humeral component is revised

Figure SSR59 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement (All Diagnoses)**



Note: Restricted to modern prostheses

Figure SSR60 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement by Gender**



Note: Restricted to modern prostheses

PROSTHESIS TYPES

The outcome of the most used humeral stem and glenoid prosthesis combinations >50 procedures used in primary total stemmed anatomic shoulder replacement are listed in Table SSR97.

The most commonly used cementless prosthesis combinations are listed in Table SSR98. Prosthesis combinations with hybrid (glenoid cemented) fixation are listed in Table SSR99.

Table SSR97 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Prosthesis Combination**

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Affinis	Affinis	22	208	0.0 (0.0, 0.0)	1.5 (0.5, 4.7)	2.6 (1.1, 6.1)	5.3 (2.9, 9.7)	6.5 (3.7, 11.1)
Ascend Flex	Perform	48	1473	0.9 (0.5, 1.5)	1.8 (1.2, 2.7)	2.4 (1.7, 3.4)	3.2 (2.3, 4.4)	4.5 (3.2, 6.1)
Comprehensive	Alliance	2	56	4.5 (1.1, 16.9)	4.5 (1.1, 16.9)	4.5 (1.1, 16.9)		
	Comprehensive	56	977	3.7 (2.7, 5.1)	4.6 (3.4, 6.1)	4.8 (3.6, 6.4)	5.5 (4.2, 7.2)	6.2 (4.7, 8.1)
Equinoxe	Equinoxe	84	758	3.0 (2.0, 4.5)	5.1 (3.7, 6.9)	6.3 (4.7, 8.4)	9.6 (7.5, 12.3)	13.3 (10.4, 16.8)
Global Unite	Global	37	1360	1.4 (0.9, 2.2)	1.9 (1.3, 2.9)	2.2 (1.5, 3.2)	2.7 (2.0, 3.9)	3.3 (2.4, 4.6)
SMR	SMR	37	562	2.2 (1.2, 3.8)	4.3 (2.9, 6.4)	4.7 (3.2, 6.9)	5.4 (3.7, 7.7)	6.1 (4.3, 8.6)
Other (4)		2	19	16.9 (4.5, 52.8)	16.9 (4.5, 52.8)	16.9 (4.5, 52.8)	16.9 (4.5, 52.8)	
TOTAL		**288**	**5413**					

Note: Restricted to modern prostheses.
Only prostheses with >50 procedures have been listed

Table SSR98 Cumulative Percent Revision of Cementless Primary Total Stemmed Anatomic Shoulder Replacement by Prosthesis Combination

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Equinoxe	Equinoxe	10	57	7.0 (2.7, 17.6)	10.8 (5.0, 22.4)	10.8 (5.0, 22.4)	13.6 (6.6, 26.7)	13.6 (6.6, 26.7)
Other (3)		0	9	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
TOTAL		**10**	**66**					

Note: Restricted to modern prostheses.
Only prostheses with >10 procedures have been listed

Table SSR99 Cumulative Percent Revision of Hybrid (Glenoid Cemented) Primary Total Stemmed Anatomic Shoulder Replacement by Prosthesis Combination

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Affinis	Affinis	20	193	0.0 (0.0, 0.0)	0.5 (0.1, 3.8)	1.6 (0.5, 5.0)	4.5 (2.3, 8.8)	5.7 (3.1, 10.3)
Ascend Flex	Perform	42	1255	0.8 (0.4, 1.5)	1.8 (1.2, 2.8)	2.6 (1.8, 3.7)	3.4 (2.5, 4.8)	4.3 (3.1, 6.0)
Comprehensive	Alliance	2	55	4.6 (1.2, 17.3)	4.6 (1.2, 17.3)	4.6 (1.2, 17.3)		
	Comprehensive	56	962	3.7 (2.7, 5.2)	4.7 (3.5, 6.2)	4.9 (3.7, 6.5)	5.6 (4.3, 7.3)	6.3 (4.8, 8.2)
Equinoxe	Equinoxe	71	670	2.6 (1.6, 4.1)	4.5 (3.1, 6.4)	5.7 (4.2, 7.9)	9.3 (7.1, 12.1)	13.5 (10.4, 17.5)
Global Unite	Global	32	1217	1.2 (0.7, 2.0)	1.7 (1.1, 2.7)	2.0 (1.4, 3.1)	2.6 (1.8, 3.8)	3.2 (2.3, 4.6)
SMR	SMR	34	538	2.3 (1.3, 4.0)	4.1 (2.7, 6.2)	4.5 (3.0, 6.7)	5.2 (3.6, 7.5)	5.7 (4.0, 8.2)
Other (4)		2	19	16.9 (4.5, 52.8)	16.9 (4.5, 52.8)	16.9 (4.5, 52.8)	16.9 (4.5, 52.8)	
TOTAL		**259**	**4909**					

Note: Restricted to modern prostheses.
Only prostheses with >50 procedures have been listed

OUTCOME FOR OSTEOARTHRITIS – PATIENT CHARACTERISTICS

There are 5,120 primary total stemmed anatomic shoulder replacement procedures with a primary diagnosis of osteoarthritis.

The cumulative percent revision of primary total stemmed anatomic shoulder replacement with a polyethylene glenoid for osteoarthritis at 14 years is 9.4%. A polyethylene glenoid includes all glenoid types except modular metal backed glenoids. There are no primary total stemmed anatomic shoulder replacements with modular metal backed glenoids undertaken in 2024 (Table SSR100).

For primary total stemmed anatomic shoulder replacements undertaken prior to 2016, there is no difference in the rate of revision compared to those procedures performed in the period 2016-2024 (Table SSR101). The most common reasons for revision are loosening (29.1%), rotator cuff insufficiency (27.6%), and instability/dislocation (23.1%) (Table SSR102 and Figure SSR61). Males are predominately revised for rotator cuff insufficiency while the reason for revision varies for females (Figure SSR62).

The most common type of revision is of the humeral/glenoid component combination (75.4%) (Table SSR103). Of note, a humeral component revision may include epiphysis and/or humeral stem and additional minor components, such as the humeral head/glenosphere and/or removal of the glenoid component. Primary total stemmed anatomic undertaken for osteoarthritis are revised to a total stemmed reverse shoulder replacement (89%) with retention of the original stem in 58.1% of occasions.

Age and Gender

Patients aged ≥65 years have a lower rate of revision compared to patients aged <65 years (Table SSR104 and Figure SSR63). Females have a higher rate of revision than males (Table SSR105 and Figure SSR64). When age is stratified by gender the rate of revision difference between age groups remains the same for males (Figure SSR65). Females aged ≥65 years have a lower rate of revision compared to females aged <65 years.

Females have a higher rate of revision compared to males.

ASA and BMI

Most patients have an ASA score of 2 or 3. ASA score is not a risk factor for revision (Table SSR106). Males with ASA scores 3-5 have a lower rate of revision than females with the same ASA scores (Table SSR107 and Figure SSR66).

The most common BMI categories are pre-obese and obese class 1. BMI is not a risk factor for revision (Table SSR108). However, when gender is considered, obese and non-obese females had a higher rate of revision than their male counterparts (Table SSR109 and Figure SSR67).

Glenoid Morphology

The category of glenoid morphology is not a risk factor for revision (Table SSR110).

Table SSR100 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Type (Primary Diagnosis OA)

Glenoid Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Polyethylene Glenoid	268	5120	2.0 (1.6, 2.4)	3.6 (3.1, 4.1)	4.7 (4.1, 5.4)	5.8 (5.1, 6.6)	7.7 (6.7, 8.9)	9.4 (7.8, 11.1)
TOTAL	**268**	**5120**						

Note: Restricted to modern prostheses

There were no procedures with metal-backed glenoids recorded in 2024

Table SSR101 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Procedure Year (Primary Diagnosis OA)

Procedure Year	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Pre 2016	87	1211	1.4 (0.9, 2.3)	2.6 (1.8, 3.7)	3.1 (2.2, 4.2)	4.4 (3.4, 5.7)	4.9 (3.8, 6.3)
2016-2024	181	3909	2.2 (1.7, 2.7)	3.2 (2.7, 3.8)	3.7 (3.1, 4.4)	4.7 (4.0, 5.5)	6.4 (5.5, 7.5)
TOTAL	**268**	**5120**					

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR102 Primary Total Stemmed Anatomic Shoulder Replacement by Reason for Revision (Primary Diagnosis OA)

Reason for Revision	Number	Percent
Loosening	78	29.1
Rotator Cuff Insufficiency	74	27.6
Instability/Dislocation	62	23.1
Pain	11	4.1
Infection	11	4.1
Fracture	7	2.6
Lysis	6	2.2
Incorrect Sizing	5	1.9
Implant Breakage Glenoid	4	1.5
Malposition	3	1.1
Arthrofibrosis	2	0.7
Implant Breakage Glenoid Insert	1	0.4
Dissociation	1	0.4
Wear Glenoid Insert	1	0.4
Other	2	0.7
TOTAL	**268**	**100.0**

Note: Restricted to modern prostheses

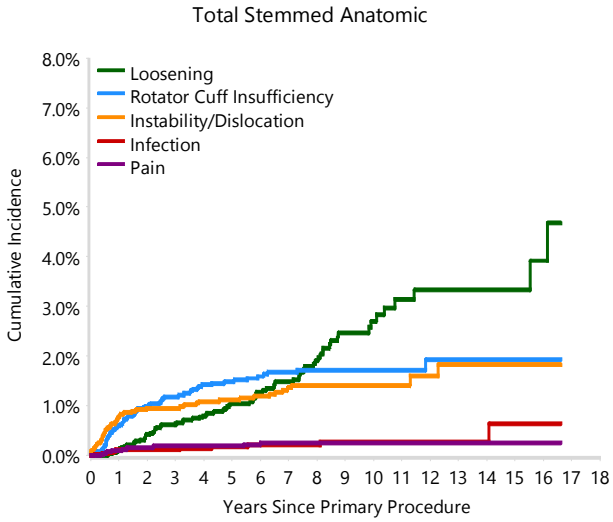
Table SSR103 Primary Total Stemmed Anatomic Shoulder Replacement by Type of Revision (Primary Diagnosis OA)

Type of Revision	Number	Percent
Humeral/Glenoid	202	75.4
Head Only	28	10.4
Glenoid Component	13	4.9
Humeral Component	12	4.5
Cement Spacer	11	4.1
Removal of Prostheses	1	0.4
Reoperation	1	0.4
TOTAL	**268**	**100.0**

Note: Restricted to modern prostheses

Humeral heads are replaced when the humeral component is revised

Figure SSR61 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement (Primary Diagnosis OA)**



Note: Restricted to modern prostheses.

Figure SSR62 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**

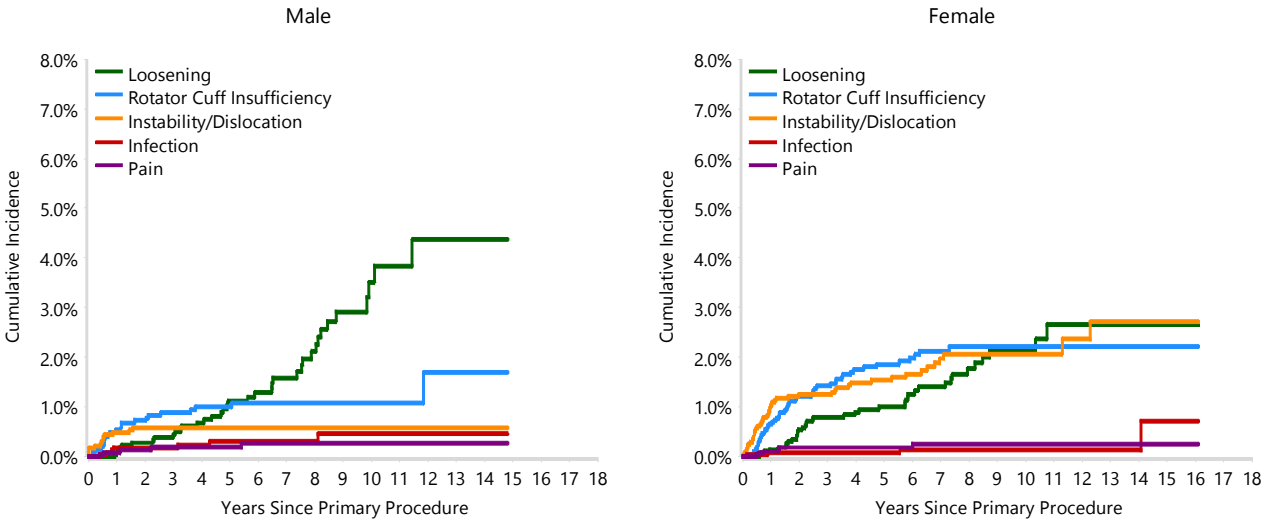
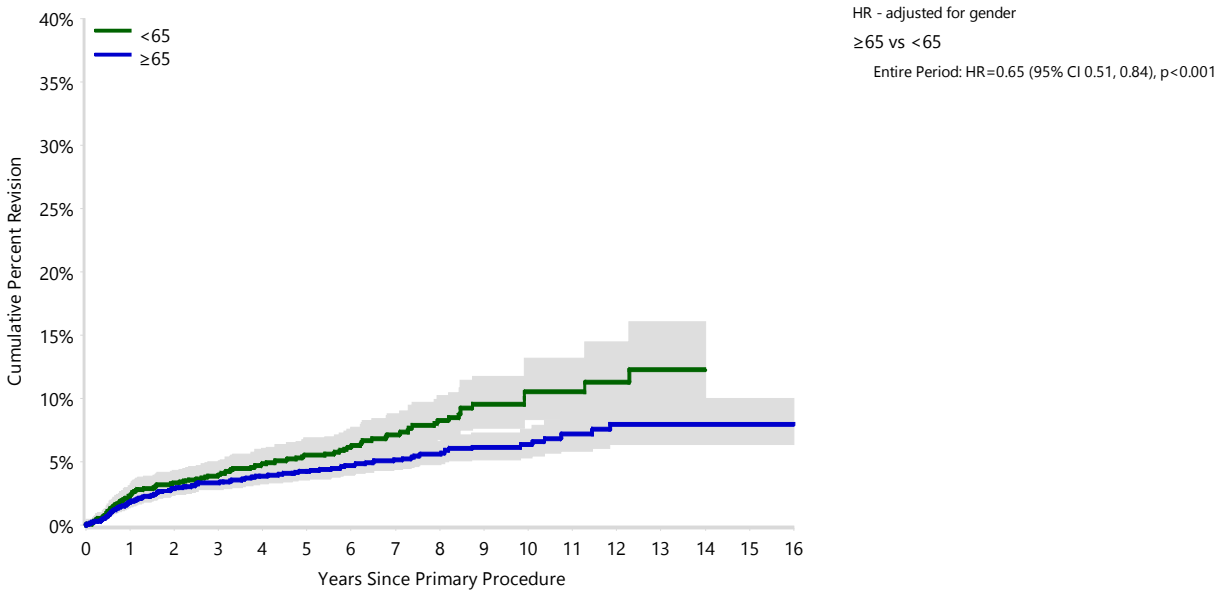


Table SSR104 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)**

Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<65	109	1698	2.3 (1.7, 3.2)	4.0 (3.1, 5.1)	5.5 (4.4, 6.9)	7.2 (5.8, 8.8)	10.5 (8.3, 13.2)	12.3 (9.3, 16.1)
≥65	159	3422	1.8 (1.4, 2.3)	3.4 (2.8, 4.1)	4.3 (3.6, 5.1)	5.2 (4.4, 6.1)	6.4 (5.3, 7.6)	8.0 (6.4, 10.0)
TOTAL	268	5120						

Note: Restricted to modern prostheses

Figure SSR63 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Age (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<65	1698	1523	1214	885	558	178	53
≥65	3422	3158	2532	1914	1217	424	106

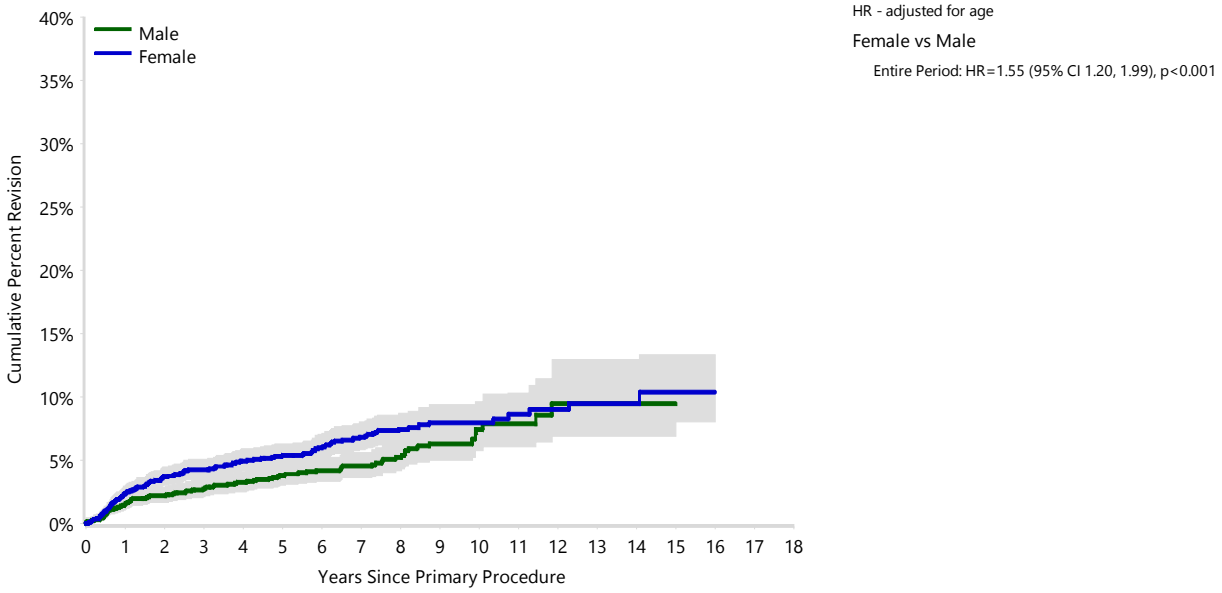
Note: Restricted to modern prostheses

Table SSR105 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Gender and Age (Primary Diagnosis OA)**

Gender	Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male		**99**	**2296**	**1.5 (1.1, 2.1)**	**2.8 (2.1, 3.5)**	**3.8 (3.1, 4.8)**	**4.5 (3.6, 5.6)**	**7.5 (5.8, 9.6)**	**9.5 (6.9, 13.0)**
	<65	49	979	1.5 (0.9, 2.5)	3.3 (2.3, 4.8)	4.7 (3.4, 6.5)	5.5 (4.0, 7.5)	9.8 (6.7, 14.0)	
	≥65	50	1317	1.6 (1.0, 2.4)	2.3 (1.6, 3.3)	3.2 (2.3, 4.4)	3.9 (2.8, 5.3)	5.9 (4.1, 8.3)	
Female		**169**	**2824**	**2.3 (1.8, 3.0)**	**4.2 (3.5, 5.1)**	**5.4 (4.5, 6.3)**	**6.8 (5.8, 8.0)**	**8.0 (6.8, 9.4)**	**9.5 (7.7, 11.7)**
	<65	60	719	3.5 (2.3, 5.1)	4.9 (3.5, 6.8)	6.6 (4.9, 8.9)	9.3 (7.0, 12.2)	11.6 (8.8, 15.3)	
	≥65	109	2105	2.0 (1.4, 2.7)	4.0 (3.2, 5.0)	4.9 (4.0, 6.0)	6.0 (4.9, 7.3)	6.8 (5.5, 8.2)	7.6 (6.0, 9.6)
TOTAL		**268**	**5120**						

Note: Restricted to modern prostheses

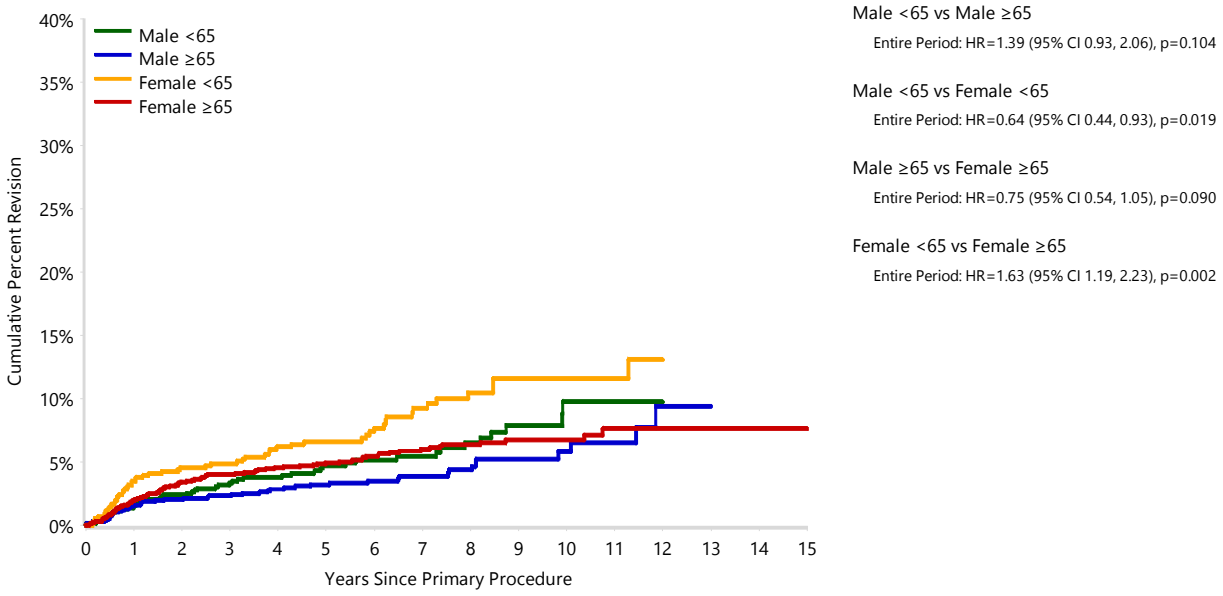
Figure SSR64 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Gender (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	2296	2101	1658	1203	754	235	56
Female	2824	2580	2088	1596	1021	367	103

Note: Restricted to modern prostheses

Figure SSR65 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Gender and Age (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Male	<65	979	881	672	477	302	92	26
	≥65	1317	1220	986	726	452	143	30
Female	<65	719	642	542	408	256	86	27
	≥65	2105	1938	1546	1188	765	281	76

Note: Restricted to modern prostheses

Table SSR106 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by ASA Score (Primary Diagnosis OA)

ASA Score	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs
ASA 1	14	295	2.5 (1.2, 5.1)	3.2 (1.7, 6.1)	3.6 (2.0, 6.7)	4.6 (2.6, 8.1)	5.3 (3.1, 9.1)	5.3 (3.1, 9.1)
ASA 2	119	2433	1.9 (1.4, 2.6)	3.0 (2.3, 3.8)	3.5 (2.8, 4.4)	4.4 (3.6, 5.4)	5.9 (4.8, 7.1)	6.5 (5.3, 7.9)
ASA 3	77	1757	2.1 (1.5, 2.9)	3.2 (2.4, 4.2)	3.7 (2.9, 4.8)	4.8 (3.8, 6.0)	5.7 (4.5, 7.2)	5.9 (4.7, 7.5)
ASA 4	2	49	2.2 (0.3, 14.4)	2.2 (0.3, 14.4)	2.2 (0.3, 14.4)	2.2 (0.3, 14.4)	8.3 (1.8, 33.3)	
ASA 5	0	1						
TOTAL	**212**	**4535**						

Note: Restricted to modern prostheses

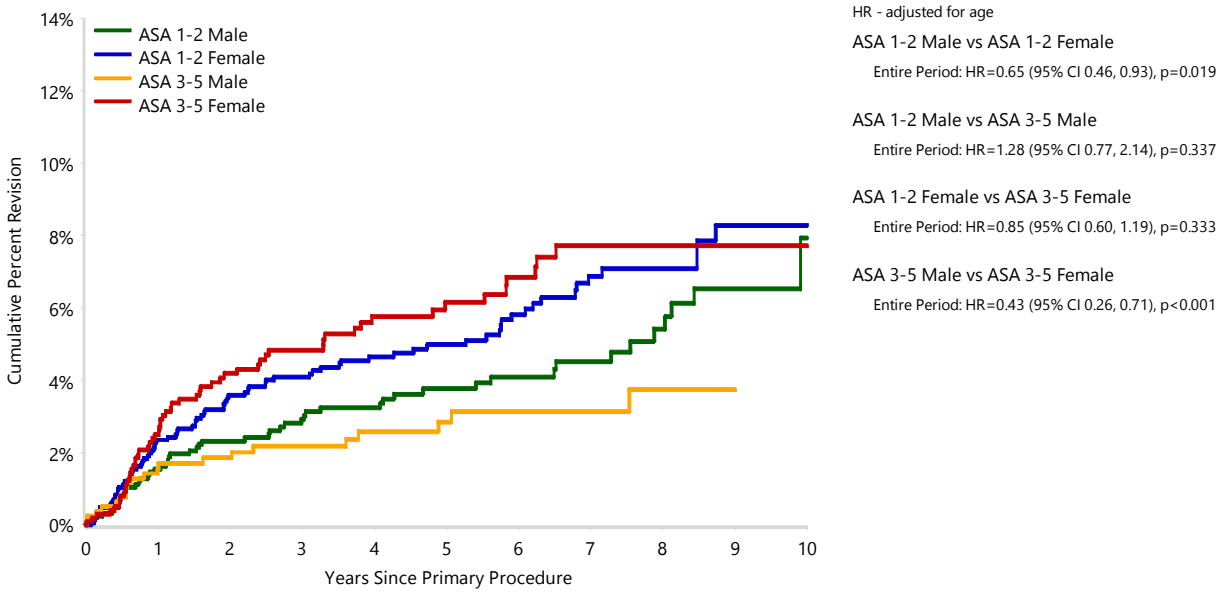
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR107 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by ASA Score and Gender (Primary Diagnosis OA)**

ASA Score	Gender	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs
ASA 1	Male	9	176	1.7 (0.6, 5.3)	3.0 (1.3, 7.0)	3.0 (1.3, 7.0)	4.7 (2.2, 9.7)	5.9 (2.9, 11.7)	5.9 (2.9, 11.7)
	Female	5	119	3.5 (1.3, 9.1)	3.5 (1.3, 9.1)	4.6 (1.9, 10.7)	4.6 (1.9, 10.7)		
ASA 2	Male	44	1101	1.5 (0.9, 2.5)	2.2 (1.5, 3.3)	2.9 (2.0, 4.2)	3.6 (2.6, 5.0)	4.3 (3.1, 6.0)	5.4 (3.8, 7.6)
	Female	75	1332	2.2 (1.6, 3.2)	3.6 (2.7, 4.8)	4.0 (3.1, 5.3)	5.0 (3.9, 6.4)	7.1 (5.6, 9.0)	7.3 (5.7, 9.3)
ASA 3	Male	20	772	1.5 (0.8, 2.6)	1.8 (1.0, 3.0)	2.1 (1.3, 3.5)	2.8 (1.8, 4.5)	3.1 (1.9, 4.9)	3.7 (2.2, 6.1)
	Female	57	985	2.6 (1.7, 3.8)	4.3 (3.1, 5.8)	4.9 (3.7, 6.6)	6.3 (4.8, 8.2)	7.6 (5.8, 9.9)	7.6 (5.8, 9.9)
ASA 4 or 5	Male	1	23	4.3 (0.6, 27.1)	4.3 (0.6, 27.1)	4.3 (0.6, 27.1)	4.3 (0.6, 27.1)	4.3 (0.6, 27.1)	
	Female	1	27	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	10.0 (1.5, 52.7)	
TOTAL		**212**	**4535**						

Note: Restricted to modern prostheses

Figure SSR66 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by ASA Score and Gender (Primary Diagnosis OA)**



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs
ASA 1-2	Male	1277	1167	1059	929	654	387	269
	Female	1451	1329	1203	1074	795	455	304
ASA 3-5	Male	795	717	620	523	355	192	132
	Female	1012	899	794	675	482	265	190

Note: Restricted to modern prostheses

Table SSR108 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by BMI Category (Primary Diagnosis OA)

BMI Category	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Underweight	0	13	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	
Normal	37	590	2.8 (1.8, 4.6)	4.4 (3.0, 6.5)	5.3 (3.7, 7.6)	5.8 (4.1, 8.3)	5.8 (4.1, 8.3)	7.5 (5.3, 10.5)
Pre Obese	53	1291	1.4 (0.9, 2.3)	2.7 (1.9, 3.8)	3.1 (2.2, 4.3)	3.7 (2.7, 5.0)	4.1 (3.0, 5.5)	4.6 (3.5, 6.2)
Obese Class 1	61	1241	2.5 (1.8, 3.6)	3.3 (2.4, 4.5)	3.9 (2.9, 5.1)	4.2 (3.2, 5.6)	4.8 (3.7, 6.3)	5.2 (4.0, 6.8)
Obese Class 2	27	633	2.0 (1.1, 3.5)	2.7 (1.6, 4.3)	2.9 (1.8, 4.6)	3.9 (2.5, 5.9)	4.2 (2.7, 6.3)	5.5 (3.6, 8.2)
Obese Class 3	15	341	2.2 (1.0, 4.5)	3.2 (1.7, 5.8)	3.9 (2.2, 6.8)	4.8 (2.9, 8.1)	4.8 (2.9, 8.1)	4.8 (2.9, 8.1)
TOTAL	**193**	**4109**						

Note: Restricted to modern prostheses

BMI has not been presented for patients aged ≤19 years

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

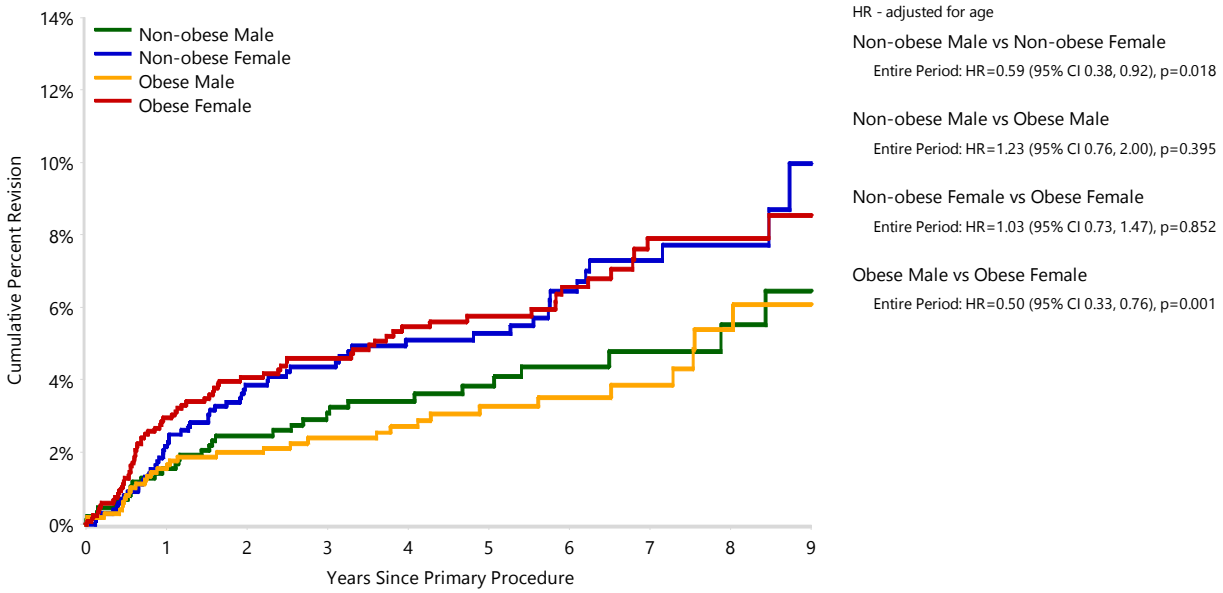
Table SSR109 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by BMI Category and Gender (Primary Diagnosis OA)

BMI Category	Gender	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Non-obese	Male	33	875	1.5 (0.9, 2.6)	2.4 (1.6, 3.8)	3.1 (2.1, 4.6)	3.4 (2.3, 5.0)	3.8 (2.6, 5.5)	4.4 (3.0, 6.3)
	Female	57	1019	2.2 (1.4, 3.3)	3.8 (2.8, 5.3)	4.4 (3.2, 5.9)	5.1 (3.8, 6.8)	5.3 (4.0, 7.0)	6.4 (4.9, 8.5)
Obese	Male	33	1010	1.5 (0.9, 2.6)	2.0 (1.3, 3.1)	2.4 (1.6, 3.6)	2.7 (1.8, 4.0)	3.3 (2.2, 4.8)	3.5 (2.4, 5.1)
	Female	70	1205	2.9 (2.1, 4.1)	4.1 (3.1, 5.4)	4.6 (3.5, 6.0)	5.5 (4.2, 7.0)	5.8 (4.5, 7.4)	6.6 (5.1, 8.4)
TOTAL		**193**	**4109**						

Note: Restricted to modern prostheses

BMI has not been presented for patients aged ≤19 years

Figure SSR67 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by BMI Category and Gender (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Non-obese	Male	875	788	694	593	486	391	283
	Female	1019	916	811	692	576	485	356
Obese	Male	1010	913	806	683	571	457	343
	Female	1205	1078	958	833	711	584	439

Note: Restricted to modern prostheses

BMI has not been presented for patients aged ≤19 years

Table SSR110 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Morphology (Primary Diagnosis OA)

Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
A1	54	1084	2.8 (1.9, 4.0)	3.7 (2.7, 5.1)	4.0 (2.9, 5.4)	4.4 (3.3, 6.0)	4.9 (3.6, 6.6)
A2	28	748	1.5 (0.9, 2.8)	2.8 (1.8, 4.4)	3.6 (2.4, 5.4)	4.1 (2.8, 6.1)	4.4 (3.0, 6.5)
B1	25	589	2.3 (1.4, 4.0)	3.4 (2.1, 5.3)	3.6 (2.3, 5.6)	4.8 (3.2, 7.3)	4.8 (3.2, 7.3)
B2	14	474	1.1 (0.5, 2.7)	1.9 (1.0, 3.8)	2.8 (1.6, 5.1)	3.2 (1.8, 5.7)	3.8 (2.2, 6.7)
C	1	88	1.2 (0.2, 8.4)	1.2 (0.2, 8.4)	1.2 (0.2, 8.4)	1.2 (0.2, 8.4)	1.2 (0.2, 8.4)
TOTAL	**122**	**2983**					

Note: Restricted to modern prostheses

Excludes 3 procedures with a recorded glenoid morphology of B3

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OUTCOME FOR OSTEOARTHRITIS – PROSTHESIS CHARACTERISTICS

Fixation

There is no difference in the rate of revision when cemented and hybrid (glenoid cemented) fixation are compared. There are too few procedures using cementless fixation for a comparative analysis to be undertaken (analysis restricted to >100 procedures) (Table SSR111).

Non-modular metal backed glenoids have a higher rate of revision than other polyethylene glenoids.

Glenoid Types and Bearing Surfaces

There are four types of glenoids, all with polyethylene bearing surface but differing methods of fixation to bone. Non- modular metal back glenoids have a polyethylene bearing surface with backside integrated metallic coating. Hybrid metal/polyethylene glenoids have a polyethylene bearing surface and one or more metallic fixation pegs. Cemented polyethylene glenoids with a modified central peg are all polyethylene but the central peg is further engineered for additional fixation to bone. All polyethylene glenoids are polyethylene fixed by cemented pegs or keels alone without further fixation features.

Modified central peg glenoids have a lower rate of revision compared to hybrid metal/polyethylene glenoids, cemented all polyethylene glenoids and non-modular metal backed glenoids for the first 6 months only (Table SSR112 and Figure SSR68).

Procedures with a metal/XLPE bearing surface (humeral head/glenoid) have a lower rate of revision compared to procedures with a metal/non XLPE bearing surface (Table SSR113 and Figure SSR69).

Metal/XLPE bearing surface has a lower rate of revision than metal/non XLPE.

Humeral Head Size

Humeral heads >50mm have a lower rate of revision compared to both <44mm and 44–50mm (Table SSR114 and Figure SSR70). When stratified by polyethylene type, both humeral sizes 44-50mm and >50mm, when combined with non XLPE polyethylene glenoids, have higher rates of revision than similar head sizes articulating with XLPE polyethylene glenoids (Table SSR115, Figure SSR71 and Figure SSR72). The cumulative incidence revision diagnosis for the most common reasons for humeral head size revision is shown in Figure SSR73.

Humeral head sizes <44mm have the highest rate of revision compared to ≥44mm head sizes.

Table SSR111 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Fixation (Primary Diagnosis OA)

Fixation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented	15	393	1.3 (0.6, 3.2)	3.1 (1.8, 5.6)	3.1 (1.8, 5.6)	6.2 (3.3, 11.5)		
Cementless	10	65	6.5 (2.5, 16.5)	10.2 (4.7, 21.3)	13.0 (6.3, 25.8)	13.0 (6.3, 25.8)		
Hybrid (Glenoid Cemented)	243	4662	2.0 (1.6, 2.4)	3.5 (3.0, 4.1)	4.7 (4.1, 5.4)	5.8 (5.0, 6.6)	7.4 (6.4, 8.6)	9.1 (7.6, 11.0)
TOTAL	**268**	**5120**						

Note: Restricted to modern prostheses

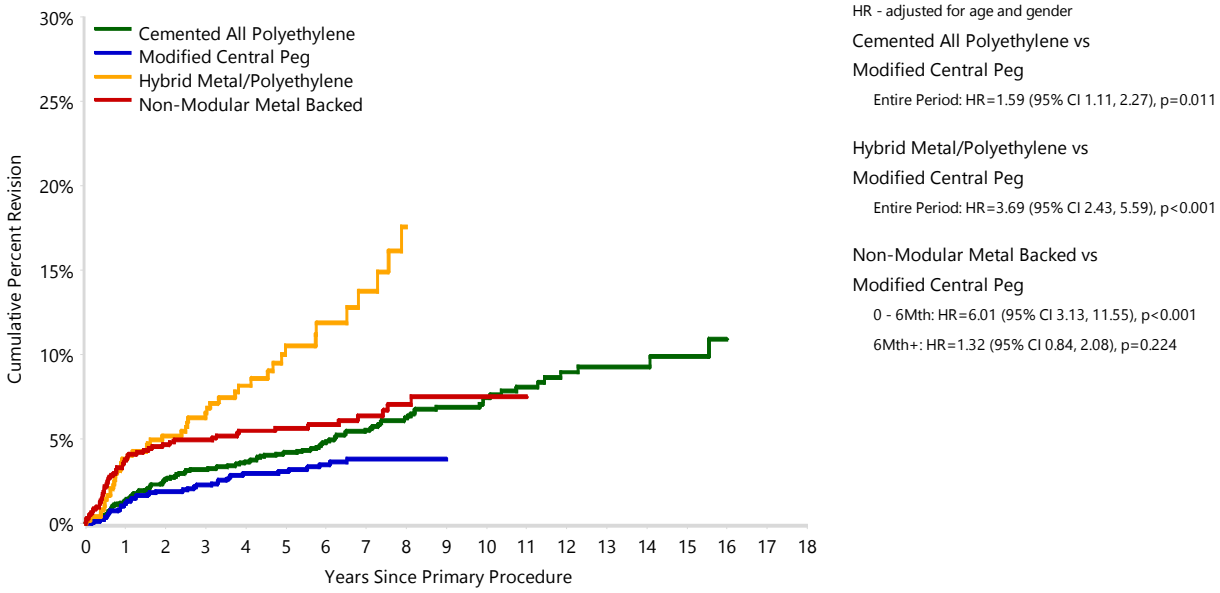
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR112 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Type (Primary Diagnosis OA)

Glenoid Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented All Polyethylene	121	2293	1.4 (0.9, 1.9)	3.2 (2.5, 4.1)	4.2 (3.4, 5.2)	5.5 (4.5, 6.8)	7.4 (6.1, 9.1)	9.3 (7.5, 11.5)
Modified Central Peg	42	1393	1.2 (0.7, 1.9)	2.3 (1.6, 3.2)	3.1 (2.2, 4.2)	3.8 (2.8, 5.2)		
Hybrid Metal/Polyethylene	50	497	3.8 (2.4, 6.0)	6.5 (4.6, 9.3)	10.5 (7.6, 14.4)	13.8 (9.9, 19.0)		
Non-Modular Metal Backed	55	937	3.8 (2.7, 5.2)	4.9 (3.7, 6.6)	5.7 (4.3, 7.4)	6.4 (4.8, 8.3)	7.5 (5.6, 10.0)	
TOTAL	**268**	**5120**						

Note: Restricted to modern prostheses

Figure SSR68 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Type (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented All Polyethylene	2293	2110	1679	1292	865	500	158
Modified Central Peg	1393	1294	1030	785	500	15	0
Hybrid Metal/Polyethylene	497	435	320	173	86	10	0
Non-Modular Metal Backed	937	842	717	549	324	77	1

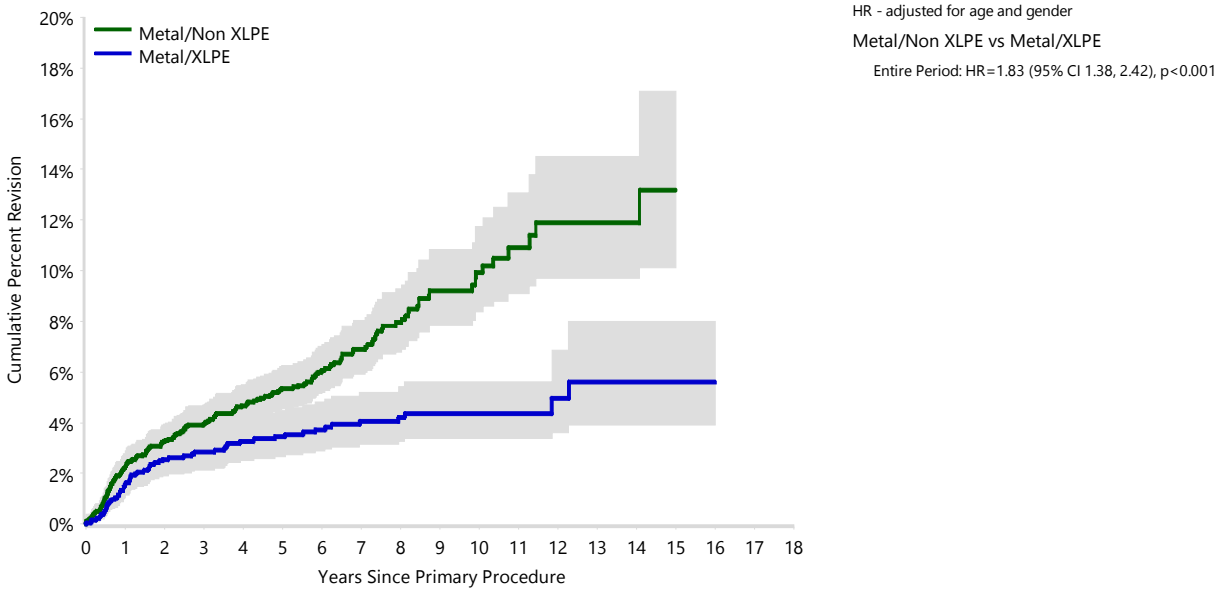
Note: Restricted to modern prostheses

Table SSR113 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Bearing Surface (Primary Diagnosis OA)

Polyethylene Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Ceramic/XLPE	1	1						
Metal/Non XLPE	201	3338	2.2 (1.8, 2.8)	3.9 (3.3, 4.7)	5.4 (4.6, 6.3)	6.9 (5.9, 8.0)	9.9 (8.4, 11.7)	11.9 (9.7, 14.5)
Metal/XLPE	66	1781	1.6 (1.1, 2.3)	2.8 (2.1, 3.8)	3.4 (2.7, 4.5)	4.1 (3.2, 5.2)	4.4 (3.4, 5.6)	5.6 (3.9, 8.0)
TOTAL	**268**	**5120**						

Note: Restricted to modern prostheses. Reported as humeral head/glenoid.

Figure SSR69 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Bearing Surface (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Metal/Non XLPE	3338	3036	2383	1694	978	362	68
Metal/XLPE	1781	1644	1363	1105	797	240	91

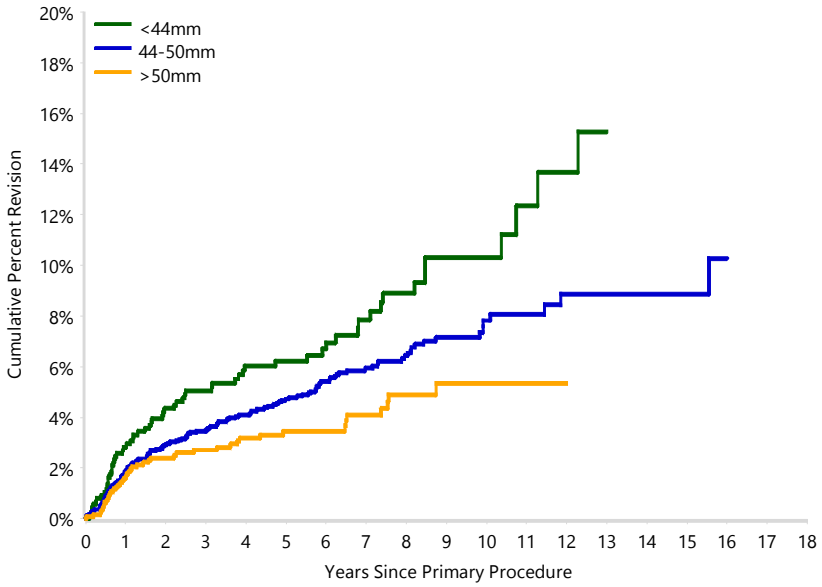
Note: Restricted to modern prostheses. Reported as humeral head/glenoid.

Table SSR114 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Head Size (Primary Diagnosis OA)

Humeral Head Size	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<44mm	66	879	2.8 (1.9, 4.2)	5.0 (3.7, 6.8)	6.2 (4.7, 8.2)	7.9 (6.0, 10.3)	10.3 (7.8, 13.6)	
44-50mm	158	3005	1.9 (1.5, 2.5)	3.5 (2.9, 4.2)	4.7 (4.0, 5.6)	5.9 (5.0, 7.0)	7.8 (6.5, 9.4)	8.9 (7.2, 10.9)
>50mm	44	1234	1.6 (1.0, 2.5)	2.7 (1.9, 3.8)	3.5 (2.5, 4.8)	4.1 (3.0, 5.6)	5.3 (3.8, 7.5)	
TOTAL	**268**	**5118**						

Note: Restricted to modern prostheses
Excludes 2 procedures with unknown head size

Figure SSR70 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Head Size (Primary Diagnosis OA)



HR - adjusted for age and gender

<44mm vs 44-50mm

Entire Period: HR=1.43 (95% CI 1.05, 1.94), p=0.022

<44mm vs >50mm

Entire Period: HR=1.93 (95% CI 1.23, 3.04), p=0.004

44-50mm vs >50mm

Entire Period: HR=1.35 (95% CI 0.94, 1.94), p=0.100

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<44mm	879	793	630	463	281	116	28
44-50mm	3005	2764	2222	1685	1093	393	109
>50mm	1234	1123	893	651	401	93	22

Note: Restricted to modern prostheses
Excludes 2 procedures with unknown head size

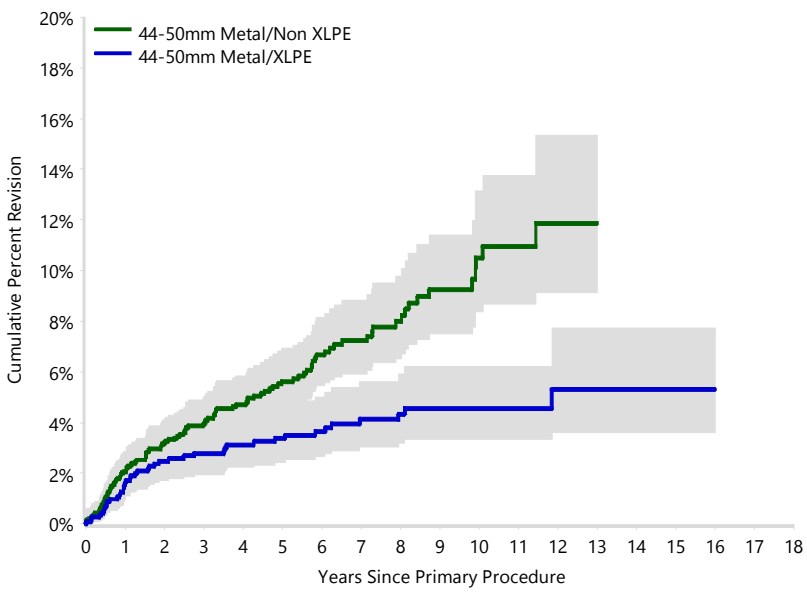
Table SSR115 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Head Size and Bearing Surface (Primary Diagnosis OA)

Humeral Head Size	Polyethylene Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
<44mm	Ceramic/XLPE	1	1						
	Metal/Non XLPE	54	764	2.8 (1.9, 4.3)	4.7 (3.3, 6.5)	5.9 (4.3, 8.0)	7.5 (5.5, 10.2)	10.4 (7.7, 14.1)	
	Metal/XLPE	11	114	2.7 (0.9, 8.1)	6.5 (3.2, 13.2)	7.7 (3.9, 14.8)	9.2 (4.8, 17.1)		
44-50mm	Metal/Non XLPE	115	1856	2.1 (1.5, 2.8)	3.9 (3.1, 5.0)	5.6 (4.6, 6.9)	7.2 (5.9, 8.8)	10.5 (8.4, 13.1)	
	Metal/XLPE	43	1149	1.6 (1.0, 2.6)	2.8 (2.0, 4.0)	3.4 (2.4, 4.7)	4.1 (3.0, 5.6)	4.6 (3.3, 6.2)	5.3 (3.6, 7.7)
>50mm	Metal/Non XLPE	32	717	1.9 (1.1, 3.2)	3.2 (2.1, 4.8)	4.1 (2.8, 6.1)	5.3 (3.6, 7.9)	7.8 (5.1, 11.7)	
	Metal/XLPE	12	517	1.2 (0.5, 2.7)	2.1 (1.1, 3.9)	2.6 (1.5, 4.6)	2.6 (1.5, 4.6)		
TOTAL		**268**	**5118**						

Note: Restricted to modern prostheses

<44mm head size comparison Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR71 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Head Size and Bearing Surface (Primary Diagnosis OA)



HR - adjusted for age and gender

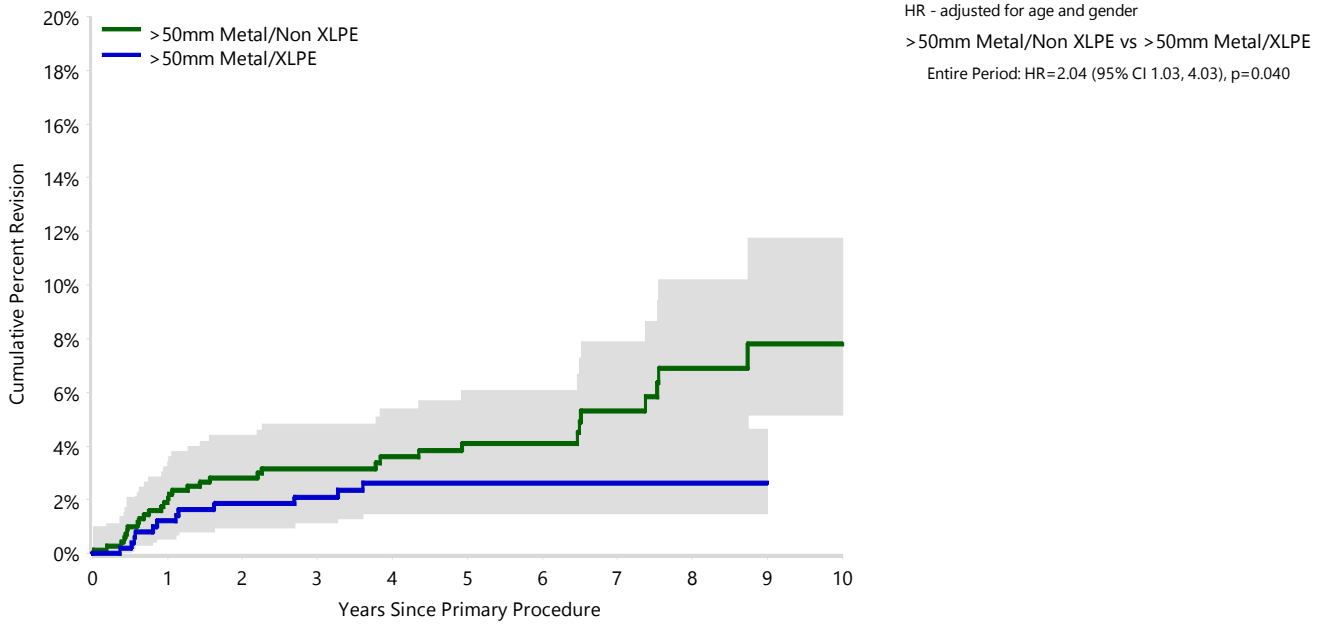
44-50mm Metal/Non XLPE vs 44-50mm Metal/XLPE

Entire Period: HR=1.95 (95% CI 1.37, 2.79), p<0.001

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
44-50mm	Metal/Non XLPE	1856	1699	1331	942	541	205	39
	Metal/XLPE	1149	1065	891	743	552	188	70

Note: Restricted to modern prostheses

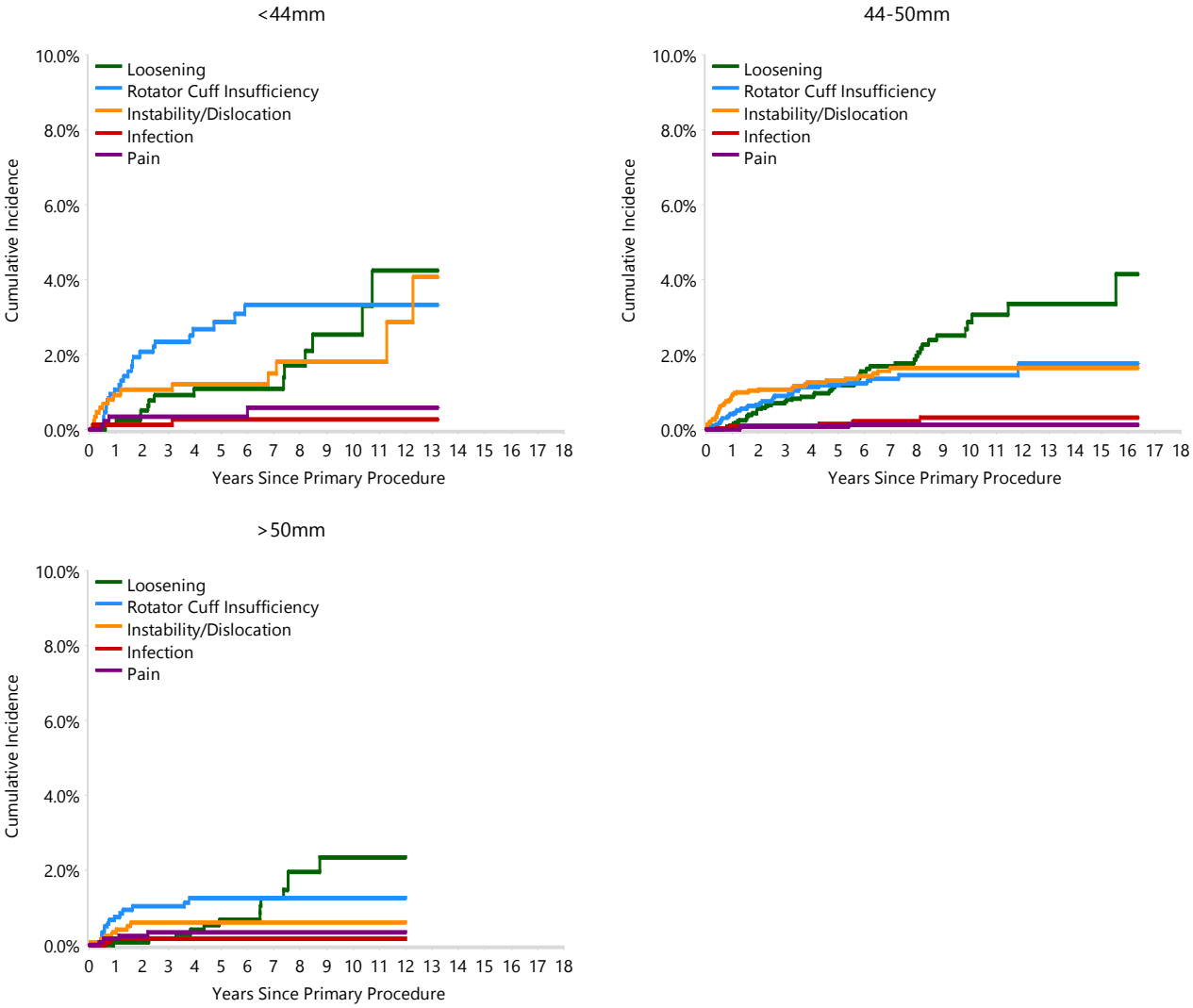
Figure SSR72 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Head Size and Bearing Surface (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
>50mm	Metal/Non XLPE	717	648	512	355	201	56	8
	Metal/XLPE	517	475	381	296	200	37	14

Note: Restricted to modern prostheses

Figure SSR73 Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Head Size (Primary Diagnosis OA)



Note: Restricted to modern prostheses

IMPLANT SIZING VARIATIONS (ISV)

ISV are modifications to a prosthesis design range beyond simple size change.

Glenoid Augmentation

A glenoid component is categorised as augmented if the backside has been modified for glenoid deformity (e.g. wedged, stepped, angulated, or lateralised). Augmented glenoids have a higher rate of revision than non-augmented prostheses (Table SSR116 and Figure SSR74). The reasons for revision are shown in Figure SSR75. There is no difference between augmented and non-augmented glenoids with differing glenoid morphology classes (Table SSR117).

Humeral Stem Length

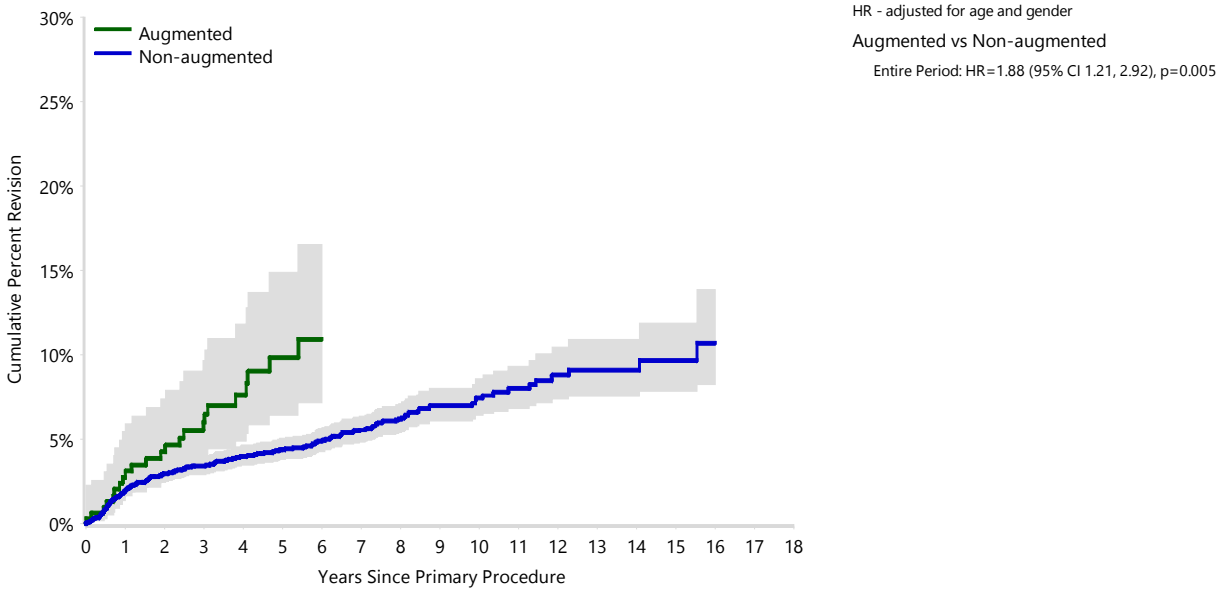
Humeral stem length is categorised as short if the size is <100mm or conventional if the size is ≥100mm. Humeral stem length is a revision risk for a short stem up to 9 months and a conventional stem after 1.5 years (Table SSR118, Figure SSR76 and Figure SSR77).

Table SSR116 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Augmentation (Primary Diagnosis OA)

Glenoid Augmentation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Augmented	23	307	2.8 (1.4, 5.4)	6.0 (3.7, 9.7)	9.8 (6.4, 14.9)			
Non-augmented	245	4799	1.9 (1.6, 2.4)	3.4 (2.9, 4.0)	4.4 (3.8, 5.1)	5.6 (4.8, 6.4)	7.4 (6.4, 8.6)	9.1 (7.6, 10.9)
TOTAL	**268**	**5106**						

Note: Restricted to modern prostheses.

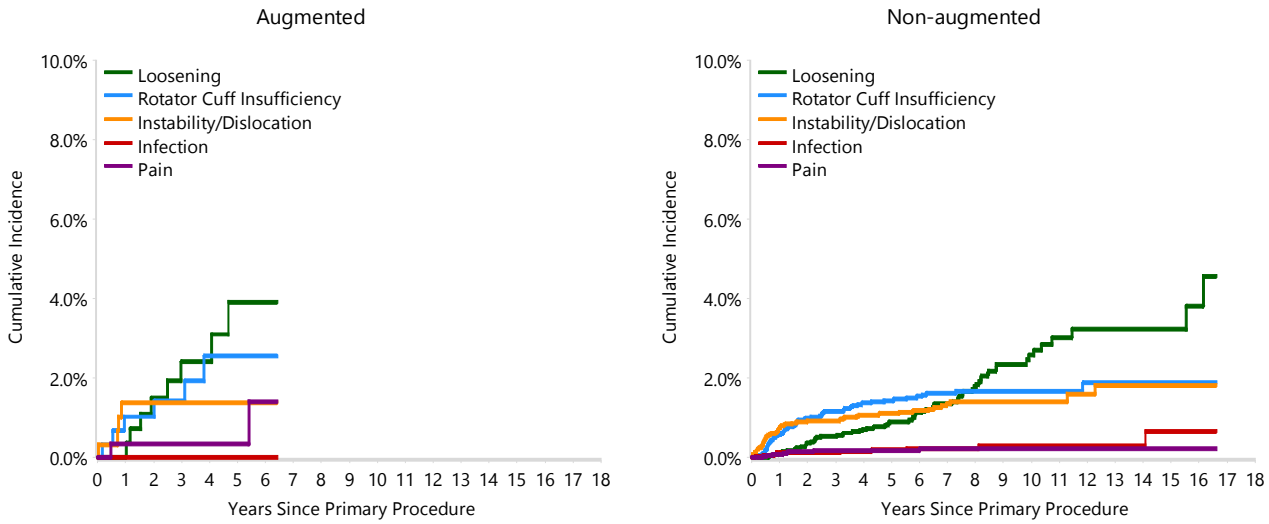
Figure SSR74 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Augmentation (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Augmented	307	271	192	103	27	0	0
Non-augmented	4799	4407	3554	2696	1748	602	159

Note: Restricted to modern prostheses

Figure SSR75 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Augmentation (Primary Diagnosis OA)**



Note: Restricted to modern prostheses

Table SSR117 **Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Glenoid Morphology and Glenoid Augmentation (Primary Diagnosis OA)**

Glenoid Morphology	Glenoid Augmentation	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
A	Augmented	5	54	1.9 (0.3, 12.6)	6.0 (2.0, 17.4)	8.6 (3.3, 21.5)	8.6 (3.3, 21.5)	12.9 (5.3, 29.9)
	Non-augmented	77	1767	2.3 (1.7, 3.1)	3.3 (2.5, 4.3)	3.7 (2.9, 4.8)	4.2 (3.3, 5.3)	4.5 (3.5, 5.7)
B	Augmented	9	179	1.8 (0.6, 5.6)	2.5 (1.0, 6.6)	3.3 (1.4, 7.9)	5.5 (2.6, 11.5)	7.1 (3.4, 14.3)
	Non-augmented	30	881	1.8 (1.1, 3.0)	2.8 (1.8, 4.2)	3.2 (2.2, 4.8)	3.9 (2.7, 5.6)	3.9 (2.7, 5.6)
C	Augmented	0	25	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
	Non-augmented	1	63	1.7 (0.2, 11.4)	1.7 (0.2, 11.4)	1.7 (0.2, 11.4)	1.7 (0.2, 11.4)	1.7 (0.2, 11.4)
TOTAL		**122**	**2969**					

Note: Restricted to modern prostheses

Excludes 2,151 procedures with unknown glenoid augmentation or glenoid morphology

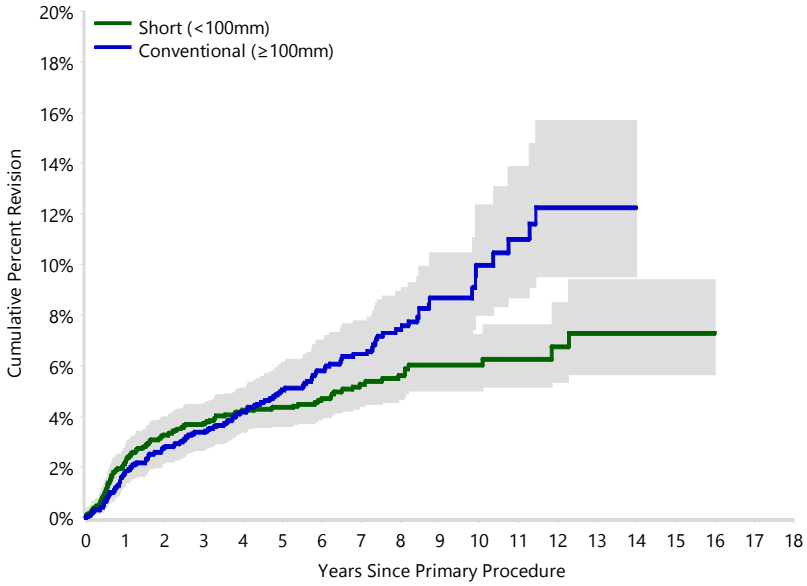
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR118 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Stem Length (Primary Diagnosis OA)

Humeral Stem Length	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Short (<100mm)	132	2889	2.2 (1.7, 2.8)	3.7 (3.1, 4.5)	4.3 (3.6, 5.2)	5.3 (4.4, 6.3)	6.0 (5.0, 7.3)	7.3 (5.6, 9.4)
Conventional (≥100mm)	136	2226	1.8 (1.3, 2.4)	3.4 (2.7, 4.2)	5.1 (4.1, 6.2)	6.5 (5.4, 7.8)	10.0 (8.0, 12.4)	12.2 (9.5, 15.7)
TOTAL	**268**	**5115**						

Note: Excludes 5 procedures with unknown humeral stem length
Restricted to modern prostheses

Figure SSR76 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Stem Length (Primary Diagnosis OA)

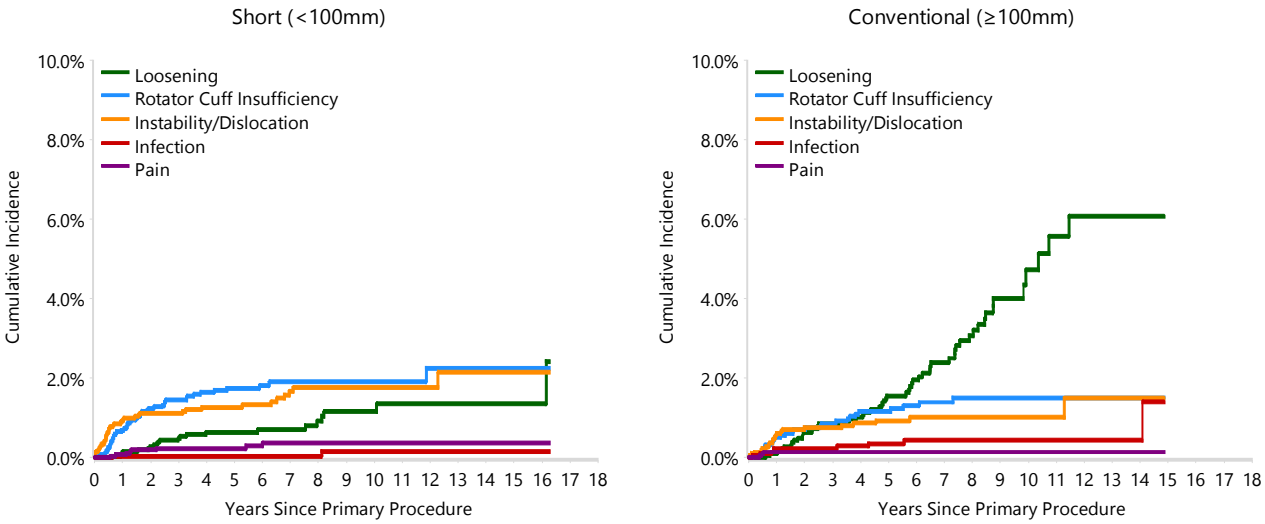


HR - adjusted for age and gender
Short (<100mm) vs Conventional (≥100mm)
0 - 9Mth: HR=1.61 (95% CI 1.00, 2.60), p=0.049
9Mth - 1.5Yr: HR=0.96 (95% CI 0.54, 1.70), p=0.891
1.5Yr+: HR=0.51 (95% CI 0.36, 0.71), p<0.001

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Short (<100mm)	2889	2592	2056	1510	918	399	100
Conventional (≥100mm)	2226	2088	1690	1289	857	203	59

Note: Excludes 5 procedures with unknown humeral stem length
Restricted to modern prostheses

Figure SSR77 Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement by Humeral Stem Length (Primary Diagnosis OA)



Note: Restricted to modern prostheses

SURGEON ASSISTIVE TOOLS (SAT)

An image derived instrument (IDI) is defined as custom made pin guides or cutting blocks derived from CT or MRI images by 3D printing specifically for each patient. There are 863 total stemmed anatomic shoulder replacements for osteoarthritis utilising an IDI since their first use in 2014.

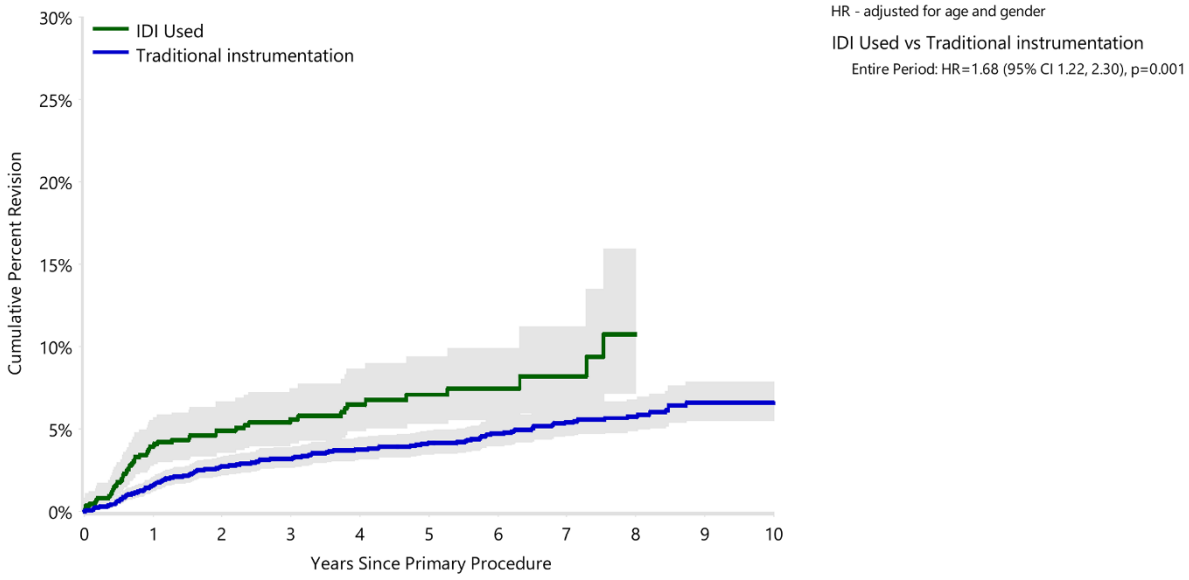
In 2024, IDI are used in 30.2% of total stemmed anatomic shoulder replacement procedures. There is an increase in the revision rate associated with IDI usage (Table SSR119 and Figure SSR78). IDI usage and glenoid morphology are listed in Table SSR120. There is no difference in the rate of revision for IDI by glenoid morphology.

Table SSR119 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement Since 2014 by IDI Usage (Primary Diagnosis OA)

IDI Use	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs	9 Yrs
IDI Used	53	863	3.9 (2.8, 5.5)	4.9 (3.6, 6.7)	5.6 (4.2, 7.5)	7.1 (5.3, 9.4)	8.2 (6.0, 11.2)	10.7 (7.2, 15.9)	
Traditional instrumentation	164	3685	1.6 (1.2, 2.1)	2.7 (2.2, 3.3)	3.2 (2.7, 3.9)	4.1 (3.5, 4.9)	5.4 (4.6, 6.4)	5.8 (4.9, 6.8)	6.6 (5.5, 7.8)
TOTAL	**217**	**4548**							

Note: Restricted to modern prostheses

Figure SSR78 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement Since 2014 by IDI Usage (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs	9 Yrs
IDI Used	863	734	634	503	264	89	43	22
Traditional Instrumentation	3685	3388	3050	2705	2026	1205	844	483

Note: Restricted to modern prostheses

Table SSR120 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement Since 2014 by IDI Usage and Glenoid Morphology (Primary Diagnosis OA)

IDI Use	Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs	8 Yrs	9 Yrs
IDI Used	A1	10	195	4.4 (2.2, 8.6)	5.0 (2.6, 9.4)	5.0 (2.6, 9.4)	5.0 (2.6, 9.4)			
	A2	12	199	3.2 (1.4, 7.0)	4.4 (2.2, 8.6)	5.3 (2.8, 10.1)	8.1 (4.3, 14.9)			
	B1	10	137	3.9 (1.7, 9.2)	3.9 (1.7, 9.2)	4.9 (2.2, 10.7)				
	B2	8	170	2.6 (1.0, 6.8)	3.4 (1.4, 8.1)	5.3 (2.5, 10.8)	7.2 (3.4, 14.7)			
	C	0	34	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
Traditional Instrumentation	A1	44	889	2.5 (1.6, 3.7)	3.5 (2.4, 5.0)	3.8 (2.7, 5.3)	4.8 (3.5, 6.7)	7.5 (5.3, 10.4)		
	A2	16	549	1.0 (0.4, 2.3)	2.2 (1.2, 4.0)	3.0 (1.8, 5.1)	3.3 (2.0, 5.5)	4.3 (2.4, 7.7)		
	B1	15	452	1.9 (0.9, 3.7)	3.2 (1.9, 5.4)	3.2 (1.9, 5.4)	3.6 (2.1, 6.1)	5.3 (2.6, 10.8)		
	B2	6	304	0.4 (0.1, 2.5)	1.1 (0.4, 3.4)	1.6 (0.6, 4.2)	2.2 (0.9, 5.2)			
	C	1	54	2.0 (0.3, 13.4)	2.0 (0.3, 13.4)	2.0 (0.3, 13.4)	2.0 (0.3, 13.4)			
TOTAL		**122**	**2983**							

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OPERATIVE TECHNIQUE

Rotator Cuff Repair

When the rotator cuff is repaired as part of a primary total stemmed anatomic replacement procedure, there is no difference in the rate of revision compared to when it is not repaired (Table SSR121).

Table SSR121 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Rotator Cuff Repair (Primary Diagnosis OA)

Rotator Cuff Repair	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Yes	6	226	2.7 (1.1, 6.5)					
No	13	566	2.1 (1.2, 4.0)	3.0 (1.8, 5.2)				
TOTAL	**19**	**792**						

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

PROSTHESIS COMBINATIONS BY PRIMARY DIAGNOSIS

The outcome of the most used (>50 procedures) prosthesis combinations are listed in Table SSR122. The most commonly used cementless prosthesis combinations are listed in Table SSR123. The most commonly used prosthesis combinations with hybrid (glenoid cemented) fixation are listed in Table SSR124.

Table SSR122 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Affinis	Affinis	21	198	0.0 (0.0, 0.0)	2.2 (0.8, 5.7)	5.0 (2.7, 9.5)	6.3 (3.5, 11.0)	8.9 (5.4, 14.3)	12.0 (7.8, 18.3)
Ascend Flex	Perform	40	1385	0.9 (0.5, 1.6)	2.2 (1.5, 3.2)	2.7 (1.9, 3.9)	4.1 (2.8, 5.8)	4.9 (3.3, 7.0)	
Comprehensive	Alliance	2	54	4.6 (1.2, 17.3)	4.6 (1.2, 17.3)				
	Comprehensive	55	930	3.8 (2.7, 5.2)	5.0 (3.7, 6.6)	5.7 (4.3, 7.5)	6.4 (4.8, 8.4)	7.5 (5.6, 10.0)	
Equinoxe	Equinoxe	80	726	3.1 (2.0, 4.6)	6.3 (4.7, 8.4)	9.6 (7.4, 12.3)	12.8 (10.0, 16.4)	24.2 (18.1, 32.0)	
Global Unite	Global	32	1277	1.1 (0.7, 1.9)	1.9 (1.3, 2.9)	2.5 (1.7, 3.6)	3.1 (2.2, 4.4)		
SMR	SMR	36	533	2.3 (1.3, 4.0)	4.9 (3.4, 7.2)	5.6 (3.9, 8.0)	6.4 (4.5, 9.0)	7.0 (5.0, 9.7)	8.0 (5.7, 11.3)
Other (4)		2	17	19.2 (5.1, 57.7)	19.2 (5.1, 57.7)	19.2 (5.1, 57.7)			
TOTAL		**268**	**5120**						

Note: Restricted to modern prostheses
Only prostheses with >50 procedures have been listed

Table SSR123 Cumulative Percent Revision of Cementless Primary Total Stemmed Anatomic Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Equinoxe	Equinoxe	10	56	7.1 (2.7, 17.9)	11.0 (5.1, 22.8)	13.8 (6.7, 27.3)	13.8 (6.7, 27.3)		
Other (3)		0	9	0.0 (0.0, 0.0)					
TOTAL		**10**	**65**						

Note: Restricted to modern prostheses
Only prostheses with >10 procedures have been listed

Table SSR124 Cumulative Percent Revision of Hybrid (Glenoid Cemented) Primary Total Stemmed Anatomic Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Affinis	Affinis	20	186	0.0 (0.0, 0.0)	1.7 (0.6, 5.2)	4.7 (2.4, 9.1)	5.9 (3.2, 10.7)	8.6 (5.2, 14.1)	11.7 (7.5, 18.1)
Ascend Flex	Perform	34	1189	0.9 (0.5, 1.6)	2.2 (1.5, 3.3)	2.9 (2.0, 4.1)	3.8 (2.6, 5.4)	4.1 (2.8, 6.0)	
Comprehensive	Alliance	2	53	4.7 (1.2, 17.7)	4.7 (1.2, 17.7)				
	Comprehensive	55	919	3.8 (2.7, 5.3)	5.0 (3.8, 6.7)	5.7 (4.4, 7.5)	6.5 (4.9, 8.5)	7.6 (5.7, 10.1)	
Equinoxe	Equinoxe	68	640	2.7 (1.7, 4.3)	5.8 (4.2, 8.0)	9.3 (7.1, 12.2)	13.1 (10.1, 17.1)	24.2 (17.5, 32.9)	
Global Unite	Global	29	1145	1.1 (0.6, 1.9)	1.9 (1.2, 2.9)	2.5 (1.7, 3.7)	3.1 (2.2, 4.5)		
SMR	SMR	33	513	2.4 (1.4, 4.2)	4.7 (3.2, 7.0)	5.4 (3.7, 7.8)	5.9 (4.1, 8.5)	6.5 (4.6, 9.3)	7.7 (5.3, 10.9)
Other (4)		2	17	19.2 (5.1, 57.7)	19.2 (5.1, 57.7)	19.2 (5.1, 57.7)			
TOTAL		**243**	**4662**						

Note: Restricted to modern prostheses
Only prostheses with >50 procedures have been listed

Primary Total Stemless Reverse Shoulder Replacement

There are 68 total stemless reverse shoulder replacements performed since 2015 (Table SSR125). This procedure is predominantly undertaken in males for the treatment of osteoarthritis or rotator cuff arthropathy (Table SSR126). CPR at 4 years is 3.0% and there have been 2 revisions (Table SSR127).

Table SSR125 Age and Gender of Primary Total Stemless Reverse Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	47	69.1%	44	79	69	68.3	6.0
Female	21	30.9%	52	82	70	70.0	6.3
TOTAL	**68**	**100.0%**	**44**	**82**	**69**	**68.8**	**6.1**

Table SSR126 Primary Total Stemless Reverse Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	36	52.9
Rotator Cuff Arthropathy	30	44.1
Fracture	1	1.5
Rheumatoid Arthritis	1	1.5
TOTAL	**68**	**100.0**

Table SSR127 Cumulative Percent Revision of Primary Total Stemless Reverse Shoulder Replacement (All Diagnoses)

Shoulder Class	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs
Total Stemless Reverse	2	68	1.5 (0.2, 10.0)	3.0 (0.8, 11.4)	3.0 (0.8, 11.4)	3.0 (0.8, 11.4)
TOTAL	**2**	**68**				

Primary Total Stemmed Reverse Shoulder Replacement

The most common primary diagnoses are osteoarthritis, rotator cuff arthropathy, and fracture.

DEMOGRAPHICS

There are 66,607 primary total stemmed reverse shoulder replacement procedures. This is an increase of 9,257 procedures compared to the previous report.

For further information on the closure of the database please see the **Glossary** of this report.

Osteoarthritis is the most common diagnosis for primary total stemmed reverse shoulder replacement followed by rotator cuff arthropathy, and fracture (Figure SSR79).

Primary total stemmed reverse shoulder replacement is more commonly undertaken in females, with females older on average than males (Table SSR128). The percentage of male patients has increased by 5.2% compared to 2016.

The proportional use in patients aged ≥75 years has declined in recent years and is now similar to the proportional use in the 65–74 year age group.

The majority of procedures use cementless fixation followed by hybrid (humerus cemented) fixation. There has been little variation in the type of fixation used since 2008 (Figure SSR80).

The polyethylene type used in total stemmed reverse shoulder replacement in 2024 is now almost equal in proportion between XLPE (49.2%) and non XLPE (50.8%) (Figure SSR81).

The most commonly used humeral stems are listed in Table SSR129. The most used glenoid prostheses are listed in Table SSR130.

Figure SSR79 Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis

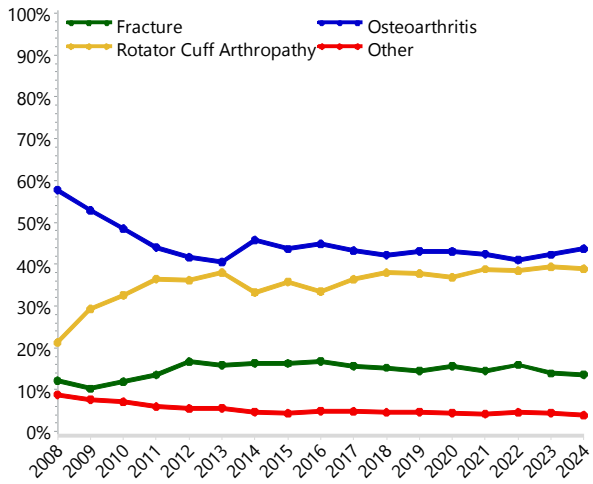


Table SSR128 Age and Gender of Primary Total Stemmed Reverse Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	25664	38.5%	14	100	72	71.9	8.3
Female	40943	61.5%	12	103	75	74.5	7.9
TOTAL	**66607**	**100.0%**	**12**	**103**	**74**	**73.5**	**8.2**

Figure SSR80 **Total Stemmed Reverse Shoulder Replacement by Fixation**

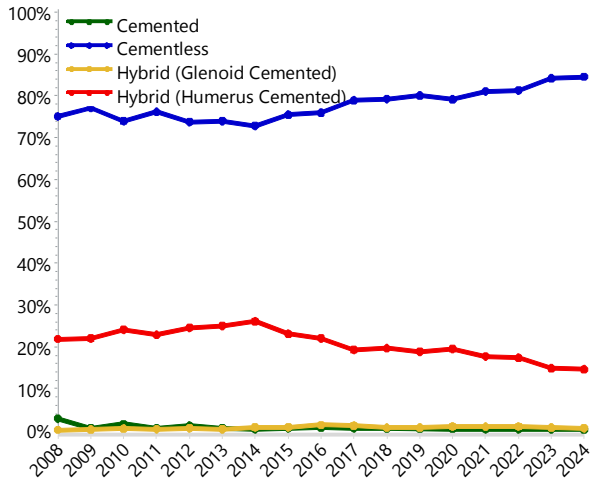


Figure SSR81 **Primary Total Stemmed Reverse Shoulder Replacement by Polyethylene Type**

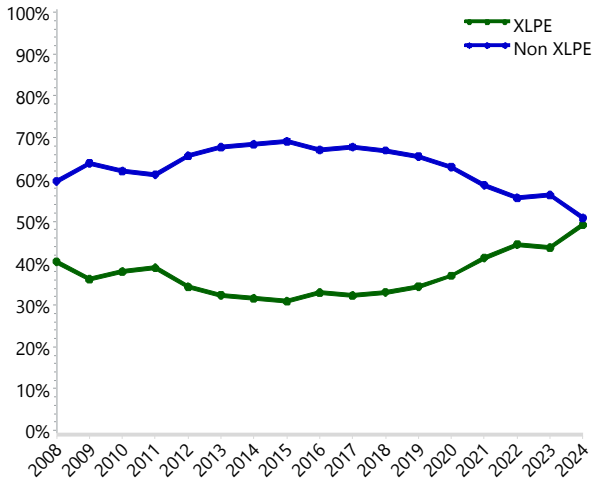


Table SSR129 **10 Most Used Humeral Stem Prostheses in Primary Total Stemmed Reverse Shoulder Replacement**

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
263	SMR	1234	SMR	1290	Comprehensive	1736	Comprehensive	2080	Comprehensive
252	Delta Xtend	1068	Comprehensive	1118	SMR	1359	Ascend Flex	1545	Ascend Flex
76	Aequalis	958	Equinoxe	1058	Equinoxe	1347	Equinoxe	1257	Equinoxe
42	Trabecular Metal	761	Ascend Flex	895	Ascend Flex	1088	SMR	1076	SMR
21	Delta CTA	711	Delta Xtend	692	Delta Xtend	773	Delta Xtend	821	AltiVate Reverse
2	Custom Made (Lima)	536	AltiVate Reverse	549	AltiVate Reverse	714	AltiVate Reverse	791	Delta Xtend
1	Generic Humeral Stem	344	Aequalis	387	Aequalis	363	Aequalis	332	Aequalis
1	Promos	294	Affinis	193	Global Unite	250	Global Unite	324	Global Unite
		246	Global Unite	149	Trabecular Metal	212	Trabecular Metal	296	MSS
		174	RSP	141	Affinis	114	Affinis	190	Trabecular Metal
10 Most Used									
658	(8) 100.0%	6326	(10) 96.1%	6472	(10) 96.7%	7956	(10) 96.7%	8712	(10) 98.0%
Remainder									
0	(0) 0%	254	(8) 3.9%	224	(7) 3.3%	269	(8) 3.3%	182	(8) 2.0%
TOTAL									
658	(8) 100.0%	6580	(18) 100.0%	6696	(17) 100.0%	8225	(18) 100.0%	8894	(18) 100.0%

Table SSR130 10 Most Used Glenoid Prostheses in Primary Total Stemmed Reverse Shoulder Replacement

2008		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
264	SMR L1	1191	SMR L1	1337	Comprehensive Reverse	1844	Comprehensive Reverse	2171	Comprehensive Reverse
252	Delta Xtend	1115	Comprehensive Reverse	1057	Equinoxe	1347	Equinoxe	1257	Equinoxe
76	Aequalis	956	Delta Xtend	1034	SMR L1	1021	Delta Xtend	1135	Perform Reversed
42	Trabecular Metal	956	Equinoxe	912	Aequalis	944	SMR L1	1114	Delta Xtend
21	Delta CTA	920	Aequalis	886	Delta Xtend	936	Aequalis	913	RSP
1	Generic Metaglene	733	RSP	691	RSP	826	RSP	902	SMR L1
1	Promos	293	Affinis	392	Perform Reversed	820	Perform Reversed	777	Aequalis
1	SMR	200	Perform Reversed	140	Affinis	118	SMR	296	MSS
		114	Trabecular Metal	95	Trabecular Metal	114	Affinis	155	SMR
		32	SMR Axioma	42	MSS	100	MSS	83	Trabecular Metal
10 Most Used									
658	(8) 100.0%	6510	(10) 98.9%	6586	(10) 98.4%	8070	(10) 98.1%	8803	(10) 99.0%
Remainder									
0	(0) 0%	70	(8) 1.1%	110	(7) 1.6%	155	(12) 1.9%	91	(12) 1.0%
TOTAL									
658	(8) 100.0%	6580	(18) 100.0%	6696	(17) 100.0%	8225	(22) 100.0%	8894	(22) 100.0%

OUTCOME FOR ALL DIAGNOSES

Primary Diagnosis

In order to keep Registry data contemporaneous, only procedures using prostheses that have been available and used in 2024 (described as modern prostheses) are included in the analyses, unless clearly specified.

Procedures undertaken for instability, rheumatoid arthritis and rotator cuff arthropathy have a higher risk of revision compared to those undertaken for osteoarthritis. Fracture also has a higher rate of revision compared to osteoarthritis, but only in the first 3 months (Table SSR131 and Figure SSR82).

Reason for Revision

The main reasons for revision are instability/dislocation, infection, loosening, and fracture (Table SSR132, Figure SSR83 and Figure SSR84). Since 2016, the proportion of revisions for instability/dislocation has increased by 16.6%, but infection and loosening have decreased by 12.2% and 9.3%, respectively.

Type of Revision

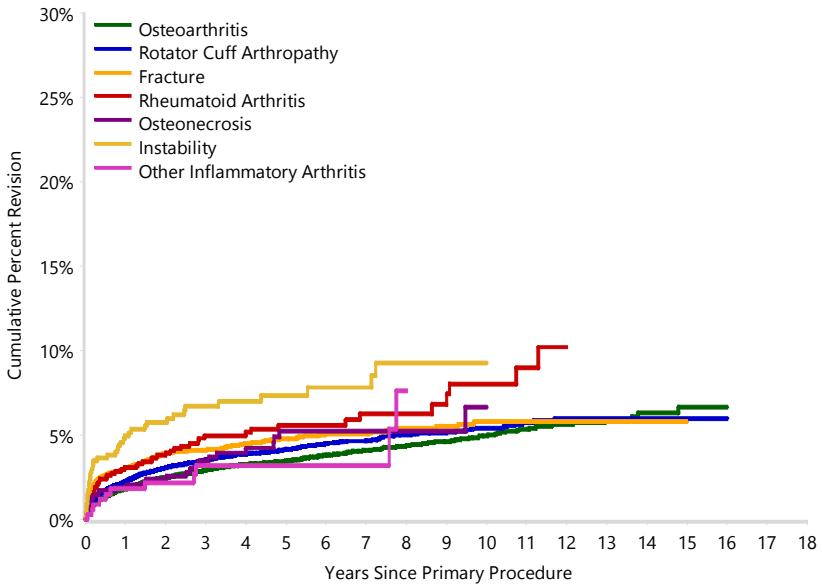
The most common types of revision involve replacement of the humeral component, replacement of the cup/head, cup only, and replacement of the humeral/glenoid (Table SSR133). The majority of total stemmed reverse revisions are to a total stemmed reverse (87.2%) with 12.8% to anatomic shoulder replacement categories. Compared to 2016, humeral component revision increased by 12.3% and humerus/glenoid by 5.5%. In contrast, cup/head only revisions decreased by 1.7% and isolated glenoid components also decreased by 4.1%.

Table SSR131 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	898	27934	1.8 (1.7, 2.0)	2.9 (2.7, 3.2)	3.5 (3.2, 3.7)	4.1 (3.8, 4.4)	5.0 (4.6, 5.4)	6.3 (5.5, 7.3)
Rotator Cuff Arthropathy	885	24122	2.3 (2.1, 2.5)	3.5 (3.3, 3.8)	4.2 (3.9, 4.5)	4.7 (4.3, 5.0)	5.4 (5.0, 5.9)	6.0 (5.4, 6.6)
Fracture	406	9589	3.1 (2.7, 3.4)	4.1 (3.7, 4.6)	4.8 (4.3, 5.3)	5.1 (4.6, 5.6)	5.8 (5.1, 6.6)	5.8 (5.1, 6.6)
Rheumatoid Arthritis	54	1012	3.1 (2.2, 4.4)	5.0 (3.7, 6.6)	5.6 (4.2, 7.4)	6.3 (4.6, 8.4)	8.0 (5.7, 11.2)	
Osteonecrosis	29	710	1.9 (1.1, 3.2)	3.5 (2.3, 5.3)	5.2 (3.5, 7.7)	5.2 (3.5, 7.7)	6.7 (4.0, 11.1)	
Instability	44	637	5.0 (3.5, 7.0)	6.7 (4.9, 9.1)	7.4 (5.4, 10.0)	7.8 (5.7, 10.6)	9.3 (6.6, 12.9)	
Other Inflammatory Arthritis	11	340	1.8 (0.8, 4.0)	3.2 (1.7, 6.2)	3.2 (1.7, 6.2)	3.2 (1.7, 6.2)		
Other (2)	36	292	6.1 (3.8, 9.8)	14.0 (9.8, 19.9)	17.1 (12.0, 23.9)			
TOTAL	**2363**	**64636**						

Note: Only primary diagnoses with >300 procedures have been listed
Restricted to modern prostheses

Figure SSR82 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis



HR - adjusted for age and gender

Rotator Cuff Arthropathy vs Osteoarthritis
Entire Period: HR=1.13 (95% CI 1.03, 1.24), p=0.010

Fracture vs Osteoarthritis
0 - 3Mth: HR=2.65 (95% CI 2.25, 3.12), p<0.001
3Mth+: HR=1.16 (95% CI 0.99, 1.36), p=0.075

Rheumatoid Arthritis vs Osteoarthritis
Entire Period: HR=1.64 (95% CI 1.24, 2.16), p<0.001

Osteonecrosis vs Osteoarthritis
Entire Period: HR=1.33 (95% CI 0.92, 1.93), p=0.129

Instability vs Osteoarthritis
0 - 3Mth: HR=3.30 (95% CI 2.15, 5.06), p<0.001
3Mth+: HR=1.58 (95% CI 1.03, 2.41), p=0.035

Other Inflammatory Arthritis vs Osteoarthritis
Entire Period: HR=1.07 (95% CI 0.59, 1.94), p=0.817

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	27934	23352	16436	10750	6155	2235	388
Rotator Cuff Arthropathy	24122	19987	13594	8566	4691	1566	203
Fracture	9589	7875	5288	3272	1816	589	75
Rheumatoid Arthritis	1012	862	604	413	251	118	29
Osteonecrosis	710	600	410	284	159	50	11
Instability	637	503	341	226	138	56	12
Other Inflammatory Arthritis	340	290	184	104	57	18	4

Note: Only primary diagnoses with >300 procedures have been listed
Restricted to modern prostheses

Table SSR132 **Primary Total Stemmed Reverse Shoulder Replacement by Reason for Revision (All Diagnoses)**

Reason for Revision	Number	Percent
Instability/Dislocation	747	31.6
Infection	608	25.7
Loosening	378	16.0
Fracture	257	10.9
Dissociation	84	3.6
Pain	49	2.1
Lysis	27	1.1
Arthrofibrosis	26	1.1
Malposition	25	1.1
Implant Breakage Glenoid	18	0.8
Incorrect Sizing	17	0.7
Heterotopic Bone	14	0.6
Metal Related Pathology	13	0.6
Rotator Cuff Insufficiency	9	0.4
Wear Humeral Cup	8	0.3
Implant Breakage Humeral	6	0.3
Tumour	5	0.2
Implant Breakage Glenoid Insert	3	0.1
Glenoid Erosion	2	0.1
Wear Glenoid Insert	1	0.0
Other	66	2.8
TOTAL	**2363**	**100.0**

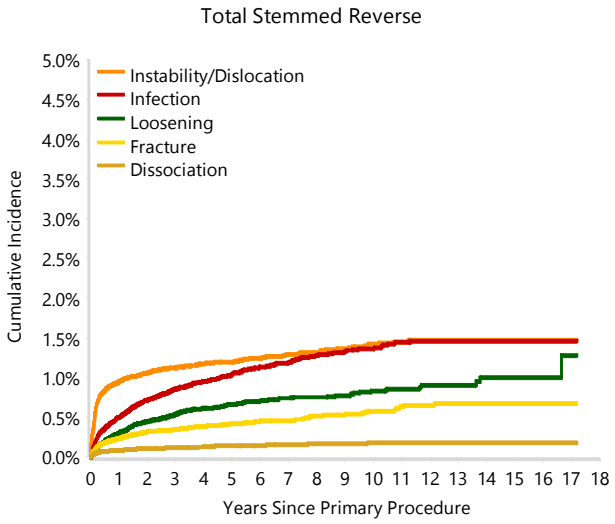
Note: Restricted to modern prostheses

Table SSR133 **Primary Total Stemmed Reverse Shoulder Replacement by Type of Revision (All Diagnoses)**

Type of Revision	Number	Percent
Humeral Component	625	26.4
Cup/Head	447	18.9
Cup Only	370	15.7
Humeral/Glenoid	234	9.9
Cement Spacer	217	9.2
Humeral Head Only	201	8.5
Glenoid Component	173	7.3
Removal of Prostheses	39	1.7
Minor Components	16	0.7
Glenosphere Only	15	0.6
Reoperation	10	0.4
Cement Only	10	0.4
Reinsertion of Components	4	0.2
Head/Insert	2	0.1
TOTAL	**2363**	**100.0**

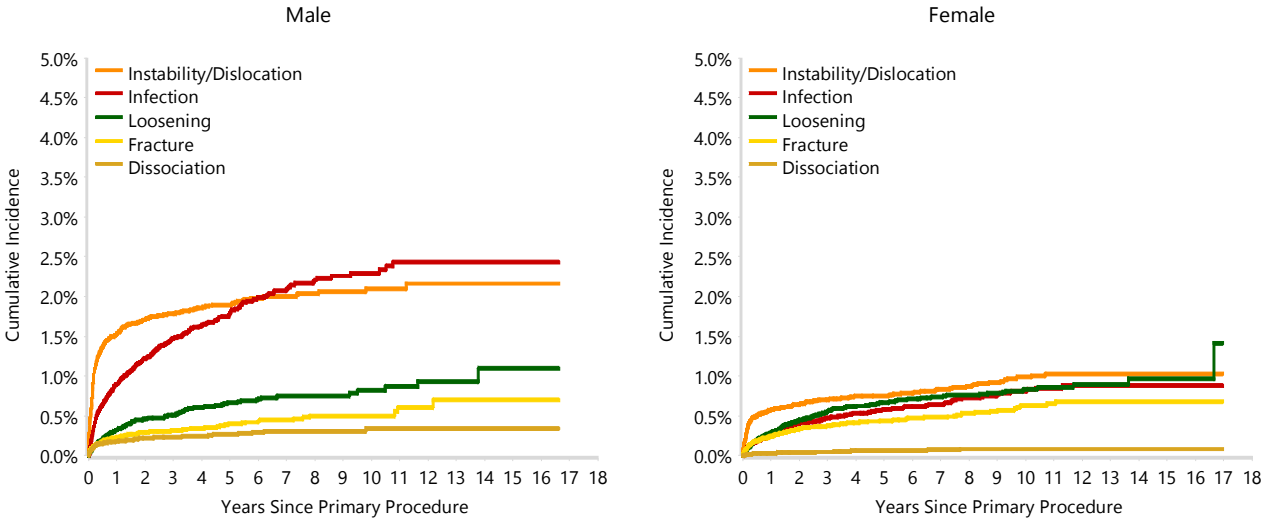
Note: Restricted to modern prostheses

Figure SSR83 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Reverse Shoulder Replacement (All Diagnoses)**



Note: Restricted to modern prostheses

Figure SSR84 Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Reverse Shoulder Replacement by Gender



Note: Restricted to modern prostheses

PROSTHESIS TYPES

The outcomes of humeral stem and glenoid prosthesis combinations (>50 procedures) used in primary total stemmed reverse shoulder replacement are listed in Table SSR134.

The most commonly used cementless prosthesis combinations are listed in Table SSR135. The most commonly used prosthesis combinations with hybrid (humerus cemented) fixation are listed in Table SSR136.

Table SSR134 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	219	4555	2.1 (1.7, 2.6)	3.5 (3.0, 4.1)	4.4 (3.8, 5.1)	5.3 (4.6, 6.1)	6.7 (5.8, 7.7)	7.2 (6.1, 8.4)
	Perform Reversed	8	438	1.1 (0.4, 2.9)	2.4 (1.1, 5.3)	2.4 (1.1, 5.3)			
Aequalis Flex Revive	Perform Reversed	3	82	2.8 (0.7, 10.6)	5.6 (1.7, 17.7)				
Affinis	Affinis	79	2030	1.7 (1.3, 2.4)	3.4 (2.7, 4.3)	4.1 (3.3, 5.1)	4.7 (3.7, 6.0)		
AltiVate	RSP	3	150	2.2 (0.7, 6.7)					
AltiVate Reverse	RSP	82	2953	2.2 (1.7, 2.8)	3.6 (2.9, 4.6)	4.0 (3.1, 5.1)			
Ascend Flex	Aequalis	157	4084	2.5 (2.0, 3.0)	4.1 (3.5, 4.8)	4.9 (4.2, 5.8)	5.3 (4.4, 6.4)	5.7 (4.6, 7.2)	
	Perform Reversed	47	2299	2.1 (1.6, 2.9)	3.0 (2.2, 4.2)	3.0 (2.2, 4.2)			
Comprehensive	Comprehensive Reverse	159	8747	1.3 (1.0, 1.5)	2.0 (1.7, 2.3)	2.5 (2.1, 3.0)	2.7 (2.2, 3.3)	3.4 (2.2, 5.2)	
	Custom Made (Comprehensive)	6	87	6.0 (2.5, 13.8)	6.0 (2.5, 13.8)	7.8 (3.5, 16.8)	7.8 (3.5, 16.8)		
	Trabecular Metal	2	89	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	2.7 (0.7, 10.2)			
Delta Xtend	Delta Xtend	490	12331	2.2 (1.9, 2.5)	3.2 (2.9, 3.5)	3.7 (3.4, 4.1)	4.2 (3.9, 4.6)	5.0 (4.5, 5.5)	6.2 (5.3, 7.1)
Equinoxe	Equinoxe	271	7297	2.3 (2.0, 2.7)	3.6 (3.1, 4.1)	4.5 (3.9, 5.1)	6.2 (5.3, 7.2)		
Global Unite	Delta Xtend	53	1816	1.6 (1.1, 2.4)	3.0 (2.2, 4.0)	3.7 (2.8, 5.0)	4.2 (3.1, 5.7)		
MSS	MSS	8	530	1.5 (0.6, 3.7)	2.4 (1.1, 5.1)				
Mets	Mets	24	135	12.0 (7.4, 19.1)	17.7 (11.7, 26.5)				
RSP	RSP	84	1855	2.8 (2.1, 3.6)	4.2 (3.4, 5.2)	4.9 (3.9, 6.0)	4.9 (3.9, 6.0)		
SMR	Custom Made (Lima)	6	80	5.2 (2.0, 13.2)	6.6 (2.8, 15.2)	10.3 (4.3, 23.9)			
	SMR	4	306	1.0 (0.3, 3.1)					
	SMR Axioma	13	209	3.4 (1.6, 6.9)	6.8 (4.0, 11.5)	6.8 (4.0, 11.5)			
	SMR L1	504	11869	2.9 (2.6, 3.2)	3.9 (3.6, 4.3)	4.3 (3.9, 4.7)	4.6 (4.2, 5.1)	5.3 (4.8, 5.8)	6.0 (5.2, 6.9)
Trabecular Metal	Comprehensive Reverse	21	551	3.3 (2.0, 5.2)	4.6 (3.0, 7.1)	4.6 (3.0, 7.1)			
	Trabecular Metal	105	1988	2.5 (1.9, 3.3)	4.4 (3.5, 5.4)	5.1 (4.2, 6.3)	5.6 (4.6, 6.7)	6.4 (5.2, 7.9)	8.1 (5.6, 11.6)
Verso	Verso	7	40	15.3 (7.2, 31.0)	18.6 (9.3, 35.3)	18.6 (9.3, 35.3)			
Other (27)		8	115	5.6 (2.5, 12.0)	8.1 (4.1, 15.6)				
TOTAL		**2363**	**64636**						

Note: Restricted to modern prostheses
Only prostheses with >50 procedures have been listed

Table SSR135 Cumulative Percent Revision of Cementless Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	143	2537	2.1 (1.6, 2.8)	3.9 (3.2, 4.7)	4.9 (4.0, 5.8)	5.9 (4.9, 7.0)	7.5 (6.2, 8.9)	8.2 (6.8, 9.9)
	Perform Reversed	2	229	0.5 (0.1, 3.3)	0.5 (0.1, 3.3)				
Aequalis Flex Revive	Perform Reversed	1	67	1.7 (0.2, 11.4)	1.7 (0.2, 11.4)				
Affinis	Affinis	41	1006	1.6 (1.0, 2.6)	3.5 (2.5, 4.9)	4.3 (3.1, 5.8)	5.1 (3.6, 7.3)		
AltiVate	RSP	3	141	2.3 (0.8, 7.1)					
AltiVate Reverse	RSP	66	2451	2.1 (1.5, 2.8)	3.6 (2.8, 4.7)	4.0 (3.1, 5.3)			
Ascend Flex	Aequalis	142	3550	2.5 (2.0, 3.1)	4.3 (3.6, 5.1)	5.1 (4.3, 6.0)	5.6 (4.6, 6.7)	6.0 (4.8, 7.6)	
	Perform Reversed	42	2007	2.3 (1.7, 3.1)	2.9 (2.1, 4.1)	2.9 (2.1, 4.1)			
Comprehensive	Comprehensive Reverse	123	7447	1.1 (0.9, 1.4)	1.9 (1.5, 2.2)	2.3 (1.9, 2.8)	2.5 (2.0, 3.1)	2.5 (2.0, 3.1)	
	Custom Made (Comprehensive)	4	78	3.9 (1.3, 11.6)	3.9 (1.3, 11.6)	5.9 (2.2, 15.2)	5.9 (2.2, 15.2)		
	Trabecular Metal	2	73	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	3.2 (0.8, 12.1)			
Delta Xtend	Delta Xtend	346	8936	2.0 (1.7, 2.3)	3.1 (2.7, 3.5)	3.7 (3.3, 4.1)	4.2 (3.8, 4.7)	5.1 (4.5, 5.7)	6.6 (5.5, 8.0)
Equinoxe	Equinoxe	223	6276	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	4.2 (3.7, 4.9)	5.9 (4.9, 7.0)		
Global Unite	Delta Xtend	31	1192	1.2 (0.7, 2.0)	2.5 (1.7, 3.7)	3.5 (2.4, 5.2)	3.8 (2.6, 5.6)		
MSS	MSS	7	507	1.4 (0.5, 3.7)	2.3 (1.0, 5.1)				
RSP	RSP	59	1470	2.5 (1.8, 3.5)	3.7 (2.8, 4.8)	4.3 (3.3, 5.5)	4.3 (3.3, 5.5)		
SMR	Custom Made (Lima)	5	77	4.0 (1.3, 12.0)	5.6 (2.1, 14.2)	9.3 (3.6, 23.4)			
	SMR	4	302	1.0 (0.3, 3.1)					
	SMR Axioma	11	203	3.0 (1.3, 6.5)	6.0 (3.3, 10.6)	6.0 (3.3, 10.6)			
	SMR L1	466	11294	2.7 (2.5, 3.1)	3.8 (3.4, 4.2)	4.1 (3.8, 4.5)	4.5 (4.1, 5.0)	5.2 (4.7, 5.8)	6.0 (5.1, 6.9)
Trabecular Metal	Comprehensive Reverse	14	391	2.7 (1.5, 5.0)	4.5 (2.6, 7.6)	4.5 (2.6, 7.6)			
	Trabecular Metal	88	1600	2.7 (2.0, 3.7)	4.6 (3.7, 5.8)	5.4 (4.3, 6.6)	5.8 (4.7, 7.1)	6.6 (5.3, 8.2)	7.0 (5.5, 8.8)
Verso	Verso	7	38	16.2 (7.6, 32.5)	19.7 (9.8, 37.1)	19.7 (9.8, 37.1)			
Other (23)		7	79	6.7 (2.8, 15.3)	10.2 (4.9, 20.3)	10.2 (4.9, 20.3)			
TOTAL		**1837**	**51951**						

Note: Restricted to modern prostheses
Only prostheses with >50 procedures have been listed

Table SSR136 Cumulative Percent Revision of Hybrid (Humerus Cemented) Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	75	1965	2.1 (1.6, 2.9)	3.0 (2.3, 3.9)	3.7 (2.9, 4.7)	4.4 (3.5, 5.6)	5.5 (4.2, 7.0)	
	Perform Reversed	6	206	1.9 (0.6, 6.1)					
Affinis	Affinis	36	965	2.0 (1.3, 3.1)	3.3 (2.3, 4.7)	4.0 (2.9, 5.5)	4.2 (3.0, 5.8)		
AltiVate Reverse	RSP	14	458	2.6 (1.5, 4.7)	3.7 (2.2, 6.3)				
Ascend Flex	Aequalis	12	496	1.9 (1.0, 3.6)	2.7 (1.5, 4.7)	2.7 (1.5, 4.7)			
	Perform Reversed	4	275	1.0 (0.2, 4.0)					
Comprehensive	Comprehensive Reverse	30	1217	1.9 (1.2, 2.8)	2.7 (1.8, 3.9)	3.5 (2.4, 5.2)	3.5 (2.4, 5.2)		
Delta Xtend	Delta Xtend	139	3285	2.7 (2.2, 3.3)	3.5 (2.9, 4.2)	3.9 (3.3, 4.7)	4.3 (3.6, 5.1)	4.9 (4.1, 5.8)	5.4 (4.4, 6.6)
Equinoxe	Equinoxe	42	964	2.8 (1.9, 4.1)	5.1 (3.7, 7.0)	5.5 (4.0, 7.6)	7.8 (4.9, 12.4)		
Global Unite	Delta Xtend	21	578	2.6 (1.5, 4.4)	4.1 (2.6, 6.3)	4.1 (2.6, 6.3)			
Mets	Mets	23	129	12.5 (7.7, 19.9)	18.6 (12.2, 27.7)				
RSP	RSP	25	357	4.0 (2.4, 6.6)	6.8 (4.5, 10.0)	7.6 (5.2, 11.1)	7.6 (5.2, 11.1)		
SMR	SMR L1	22	422	4.2 (2.6, 6.6)	5.6 (3.7, 8.5)	5.6 (3.7, 8.5)	5.6 (3.7, 8.5)	5.6 (3.7, 8.5)	
Trabecular Metal	Comprehensive Reverse	7	152	4.8 (2.3, 9.8)	4.8 (2.3, 9.8)				
	Trabecular Metal	15	354	1.7 (0.8, 3.8)	3.4 (1.9, 6.1)	4.3 (2.5, 7.4)	4.9 (2.9, 8.3)	6.3 (3.5, 11.3)	
Other (22)		8	109	6.9 (3.4, 14.1)					
TOTAL		**479**	**11932**						

Note: Restricted to modern prostheses

Only prostheses with >50 procedures have been listed

OUTCOME FOR OSTEOARTHRITIS, ROTATOR CUFF ARTHROPATHY AND FRACTURE– PATIENT CHARACTERISTICS

There are 27,934 primary total stemmed reverse shoulder replacement procedures with a primary diagnosis of osteoarthritis, 24,122 for rotator cuff arthropathy, and 9,589 for fracture. This year the 3 predominate primary diagnoses are being presented concurrently for the purpose of comparison.

The cumulative percent revision of primary total stemmed reverse shoulder replacement for osteoarthritis at 14 years is 6.3%, 6.0% for rotator cuff arthropathy, and 5.8% for fracture (Table SSR137 and Figure SSR85).

Compared to the pre-2016 period, total stemmed reverse replacements 2016-2023 have a lower rate of revision for osteoarthritis and for rotator cuff arthropathy, but not for fracture (Table SSR138 and Figure SSR86, and Figure SSR87).

The most common reasons for revision are instability/dislocation (10.8% for osteoarthritis, 12% rotator cuff arthropathy and 8.2% for fracture), infection (11.7%, 9.7%, and 4.5%) and loosening (7.6%, 6.3%, and 2.3%, respectively) (Table SSR139 and Figure SSR88).

The most common types of revision are humeral component only (10.1% for osteoarthritis, 9.5% for rotator cuff arthropathy and 6.4% for fracture), replacement of both cup (liner) and glenosphere (8%, 7.7% and 3.4%), and cup only revisions (5.7%, 6.3%, and 3.9%, respectively) (Table SSR140).

When only the humeral component is revised, this may be associated with exchange of the epiphysis and/or humeral stem and additional minor components such as the liner. Most revisions are to a total stemmed reverse replacement (84.7% for osteoarthritis, 87.2% for rotator cuff arthropathy and 94% for fracture).

Age and Gender

Primary total stemmed reverse shoulder replacement, when used for the management of osteoarthritis, is most common in patients aged ≥65 years. Patients aged ≥65 years have a lower rate of revision compared to patients aged <65 years for all three most common primary diagnoses (Table SSR141, Figure SSR89, Figure SSR90 and Figure SSR91).

Males have a higher rate of revision than females for osteoarthritis, rotator cuff arthropathy and fracture (Table SSR142, Figure SSR92, Figure SSR93 and Figure SSR94). Males are predominately revised for instability/dislocation and infection compared to loosening in females (Figure SSR95).

Males have a higher rate of revision compared to females.

ASA and BMI

Patients with ASA scores 3-5 have higher rates of revision compared to patients with an ASA score of 1-2 for all primary diagnoses (Table SSR143, Figure SSR96, Figure SSR97 and Figure SSR98).

When the primary diagnosis is osteoarthritis, patients who are obese have a higher rate of revision compared to non-obese patients w for the first 9 months only. After this time, obese patients have a lower rate of revision than non-obese patients.

Obese patients undergoing total stemmed reverse shoulder replacement for fracture have a higher rate of revision than non-obese patients.

Obese patients undergoing a total stemmed reverse for rotator cuff arthropathy have an increased rate of revision for the first 3 months, and after this time there is no difference compared to non-obese patients (Table SSR144, Figure SSR99, Figure SSR100 and Figure SSR101).

Glenoid Morphology

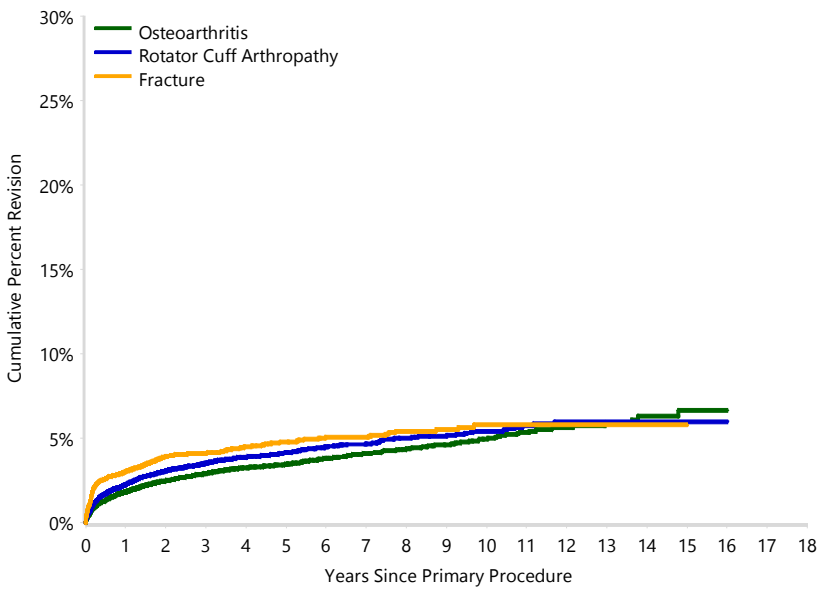
The outcome of the different morphology categories is presented in Table SSR145. The category of glenoid morphology is not a risk factor for revision for any of the three primary diagnoses for total stemmed reverse shoulder replacement.

Table SSR137 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	406	9589	3.1 (2.7, 3.4)	4.1 (3.7, 4.6)	4.8 (4.3, 5.3)	5.1 (4.6, 5.6)	5.8 (5.1, 6.6)	5.8 (5.1, 6.6)
Osteoarthritis	898	27934	1.8 (1.7, 2.0)	2.9 (2.7, 3.2)	3.5 (3.2, 3.7)	4.1 (3.8, 4.4)	5.0 (4.6, 5.4)	6.3 (5.5, 7.3)
Rotator Cuff Arthropathy	885	24122	2.3 (2.1, 2.5)	3.5 (3.3, 3.8)	4.2 (3.9, 4.5)	4.7 (4.3, 5.0)	5.4 (5.0, 5.9)	6.0 (5.4, 6.6)
TOTAL	**2189**	**61645**						

Note: Restricted to modern prostheses

Figure SSR85 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis



HR - adjusted for age and gender

Rotator Cuff Arthropathy vs Osteoarthritis

Entire Period: HR=1.13 (95% CI 1.03, 1.24), p=0.011

Fracture vs Osteoarthritis

0 - 3Mth: HR=2.68 (95% CI 2.27, 3.16), p<0.001

3Mth+: HR=1.16 (95% CI 0.99, 1.36), p=0.069

Fracture vs Rotator Cuff Arthropathy

0 - 3Mth: HR=2.38 (95% CI 2.01, 2.81), p<0.001

3Mth+: HR=1.03 (95% CI 0.88, 1.21), p=0.725

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	27934	23352	16436	10750	6155	2235	388
Rotator Cuff Arthropathy	24122	19987	13594	8566	4691	1566	203
Fracture	9589	7875	5288	3272	1816	589	75

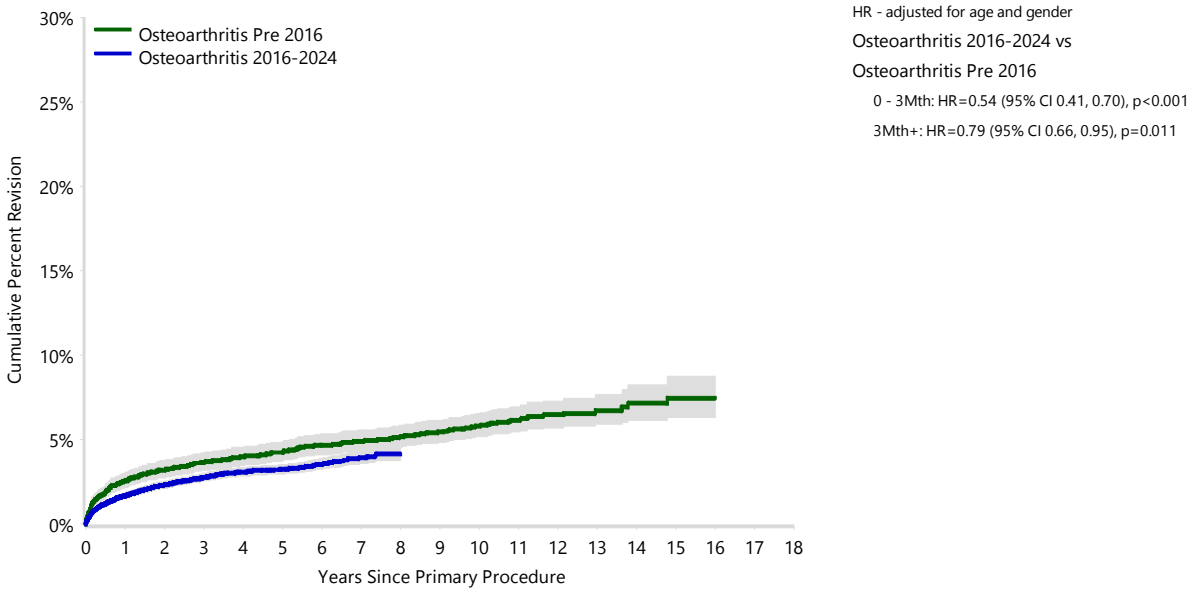
Note: Restricted to modern prostheses

Table SSR138 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Procedure Year

Primary Diagnosis	Procedure Year	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis									
	Pre 2016	277	4923	2.6 (2.2, 3.1)	3.7 (3.2, 4.2)	4.2 (3.7, 4.9)	4.9 (4.3, 5.6)	5.8 (5.2, 6.6)	7.1 (6.2, 8.3)
	2016-2024	621	23011	1.7 (1.5, 1.8)	2.8 (2.5, 3.0)	3.3 (3.0, 3.5)	3.9 (3.6, 4.3)		
Rotator Cuff Arthropathy									
	Pre 2016	217	3703	2.8 (2.3, 3.4)	4.1 (3.5, 4.8)	5.0 (4.3, 5.8)	5.4 (4.7, 6.2)	6.2 (5.4, 7.0)	6.7 (5.8, 7.7)
	2016-2024	668	20419	2.2 (2.0, 2.4)	3.4 (3.1, 3.7)	3.9 (3.6, 4.3)	4.5 (4.2, 4.9)		
Fracture									
	Pre 2016	68	1592	2.5 (1.8, 3.4)	3.3 (2.5, 4.3)	3.7 (2.8, 4.7)	4.0 (3.1, 5.1)	4.8 (3.8, 6.1)	4.8 (3.8, 6.1)
	2016-2024	338	7997	3.2 (2.8, 3.6)	4.3 (3.9, 4.8)	5.1 (4.5, 5.7)	5.3 (4.8, 6.0)		
TOTAL		**2189**	**61645**						

Note: Restricted to modern prostheses;
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

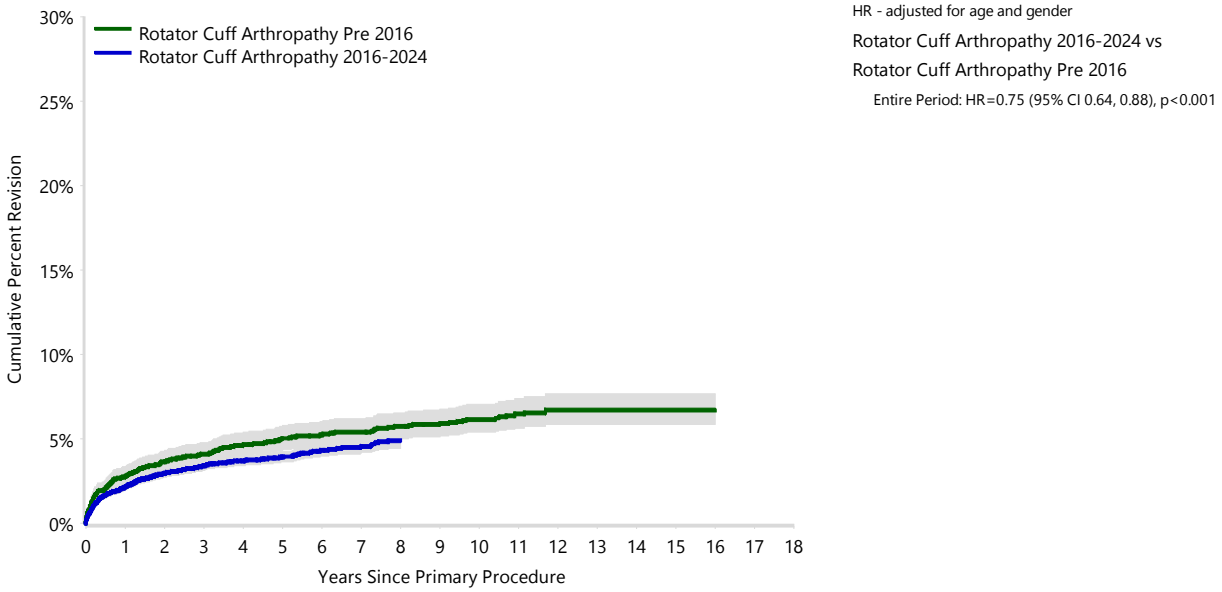
Figure SSR86 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Procedure Year (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	Pre 2016	4923	4727	4450	4098	3622	2235	388
	2016-2024	23011	18625	11986	6652	2533	0	0

Note: Restricted to modern prostheses

Figure SSR87 **Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Procedure Year (Primary Diagnosis Rotator Cuff Arthropathy)**



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Rotator Cuff Arthropathy	Pre 2016	3703	3547	3307	3013	2699	1566	203
	2016-2024	20419	16440	10287	5553	1992	0	0

Note: Restricted to modern prostheses

Table SSR139 **Primary Total Stemmed Reverse Shoulder Replacement by Reason for Revision and Primary Diagnosis**

Reason for Revision	Osteoarthritis		Rotator Cuff Arthropathy		Fracture	
	N	Percent	N	Percent	N	Percent
Instability/Dislocation	237	10.8	180	8.2	262	12.0
Infection	256	11.7	99	4.5	212	9.7
Loosening	166	7.6	50	2.3	138	6.3
Fracture	91	4.2	45	2.1	104	4.8
Dissociation	28	1.3	6	0.3	41	1.9
Pain	20	0.9	4	0.2	24	1.1
Arthrofibrosis	12	0.5	8	0.4	5	0.2
Malposition	10	0.5	2	0.1	12	0.5
Lysis	12	0.5	2	0.1	10	0.5
Implant Breakage Glenoid	8	0.4	2	0.1	8	0.4
Incorrect Sizing	4	0.2	1	0.0	12	0.5
Heterotopic Bone	7	0.3	3	0.1	4	0.2
Metal Related Pathology	5	0.2	.	.	8	0.4
Rotator Cuff Insufficiency	5	0.2	.	.	4	0.2
Wear Humeral Cup	5	0.2	.	.	3	0.1
Implant Breakage Humeral	2	0.1	.	.	3	0.1
Glenoid Erosion	1	0.0	.	.	1	0.0
Implant Breakage Glenoid Insert	.	.	1	0.0	1	0.0
Tumour	.	.	1	0.0	.	.
Other	29	1.3	2	0.1	33	1.5
TOTAL	**898**	**41.0**	**406**	**18.5**	**885**	**40.4**

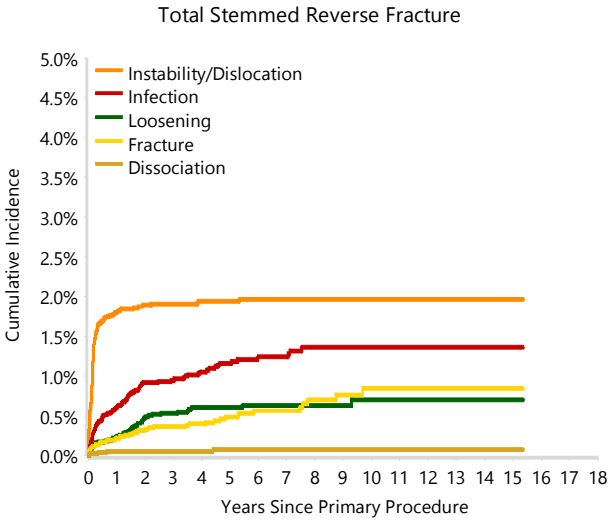
Note: Restricted to modern prostheses

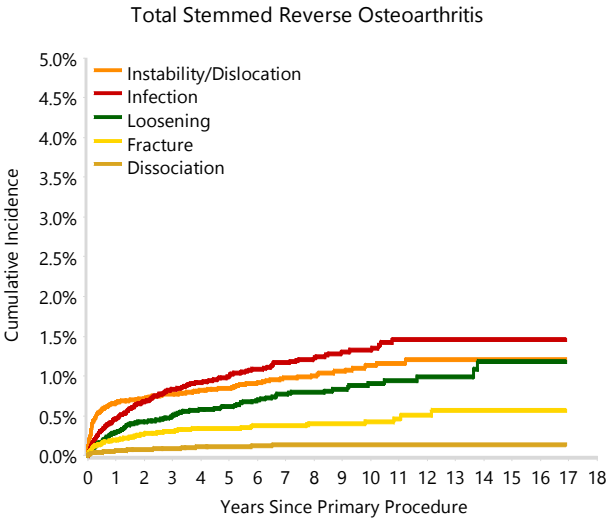
Table SSR140 Primary Total Stemmed Reverse Shoulder Replacement by Type of Revision and Primary Diagnosis

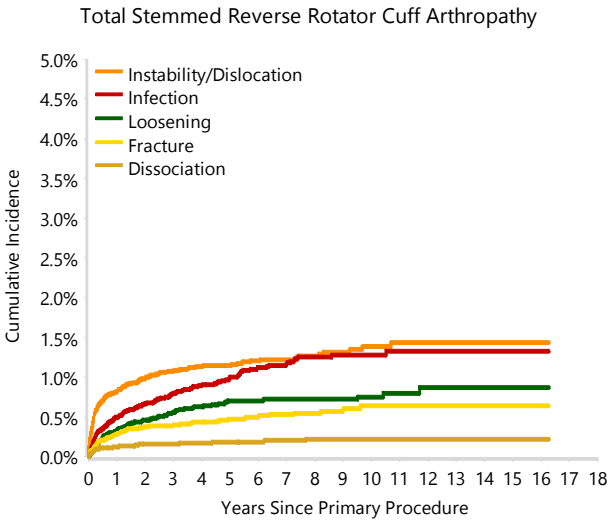
Type of Revision	Osteoarthritis		Rotator Cuff Arthropathy		Fracture	
	N	Total%	N	Total%	N	Total%
Humeral Component	220	10.1	141	6.4	207	9.5
Cup/Head	176	8.0	75	3.4	169	7.7
Cup Only	125	5.7	86	3.9	137	6.3
Humeral/Glenoid	90	4.1	33	1.5	97	4.4
Cement Spacer	102	4.7	31	1.4	68	3.1
Humeral Head Only	94	4.3	11	0.5	77	3.5
Glenoid Component	66	3.0	10	0.5	89	4.1
Removal of Prostheses	11	0.5	8	0.4	15	0.7
Glenosphere Only	3	0.1	1	0.0	10	0.5
Minor Components	5	0.2	6	0.3	3	0.1
Cement Only	5	0.2	1	0.0	4	0.2
Reoperation	1	0.0	2	0.1	5	0.2
Reinsertion of Components	.	.	.	.	3	0.1
Head/Insert	.	.	1	0.0	1	0.0
TOTAL	**898**	**41.0**	**406**	**18.5**	**885**	**40.4**

Note: Restricted to modern prostheses

Figure SSR88 Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis







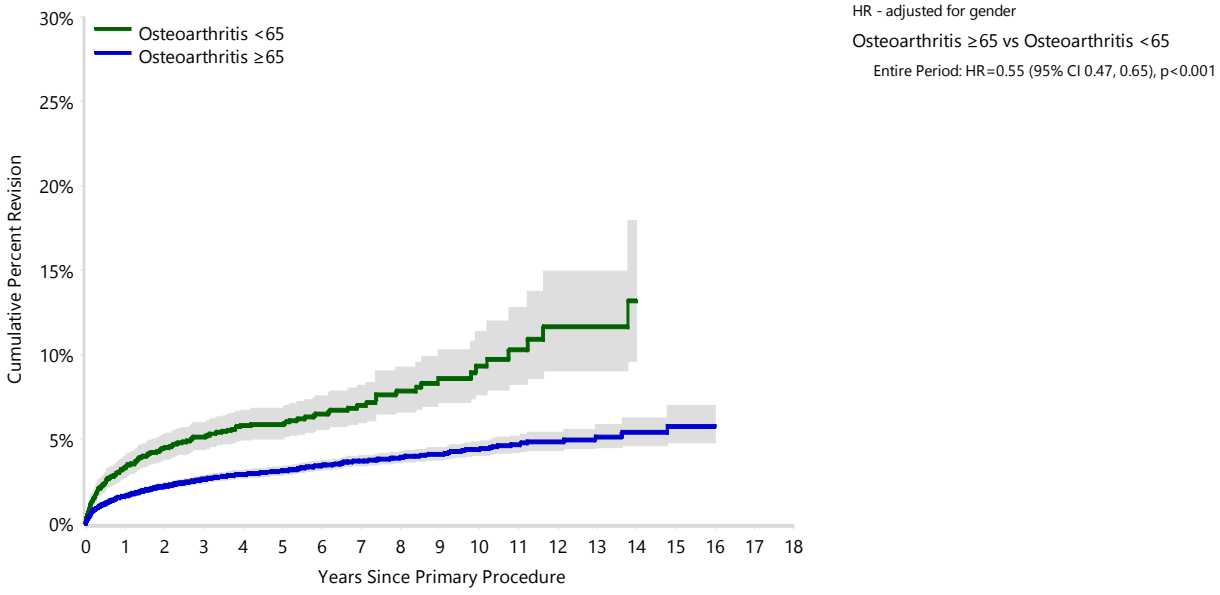
Note: Restricted to modern prostheses

Table SSR141 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Age

Primary Diagnosis	Age	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis									
	<65	192	3439	3.3 (2.8, 4.0)	5.1 (4.4, 6.0)	5.9 (5.0, 6.8)	7.0 (6.0, 8.2)	9.3 (7.6, 11.4)	13.2 (9.6, 17.9)
	≥65	706	24495	1.6 (1.5, 1.8)	2.6 (2.4, 2.9)	3.1 (2.9, 3.4)	3.7 (3.4, 4.0)	4.4 (4.0, 4.8)	5.4 (4.6, 6.3)
Rotator Cuff Arthropathy									
	<65	152	2929	2.9 (2.3, 3.6)	5.4 (4.5, 6.4)	6.2 (5.2, 7.3)	6.8 (5.8, 8.1)	8.1 (6.5, 10.1)	
	≥65	733	21193	2.2 (2.0, 2.4)	3.3 (3.0, 3.5)	3.9 (3.6, 4.2)	4.4 (4.1, 4.7)	5.1 (4.6, 5.6)	5.4 (4.8, 6.0)
Fracture									
	<65	107	1436	5.0 (4.0, 6.3)	7.0 (5.8, 8.6)	8.5 (7.0, 10.4)	9.2 (7.5, 11.3)	12.1 (9.1, 16.1)	
	≥65	299	8153	2.7 (2.4, 3.1)	3.6 (3.2, 4.1)	4.1 (3.7, 4.6)	4.3 (3.9, 4.9)	4.7 (4.2, 5.4)	4.7 (4.2, 5.4)
TOTAL		2189	61645						

Note: Restricted to modern prostheses

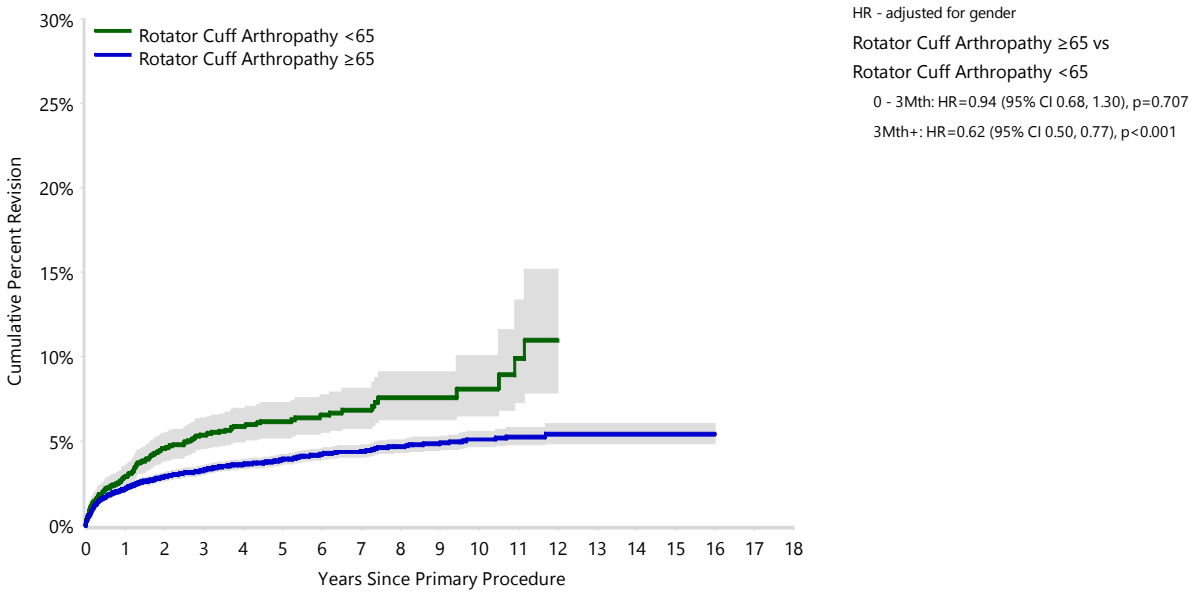
Figure SSR89 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	<65	3439	2771	1895	1154	636	233	53
	≥65	24495	20581	14541	9596	5519	2002	335

Note: Restricted to modern prostheses

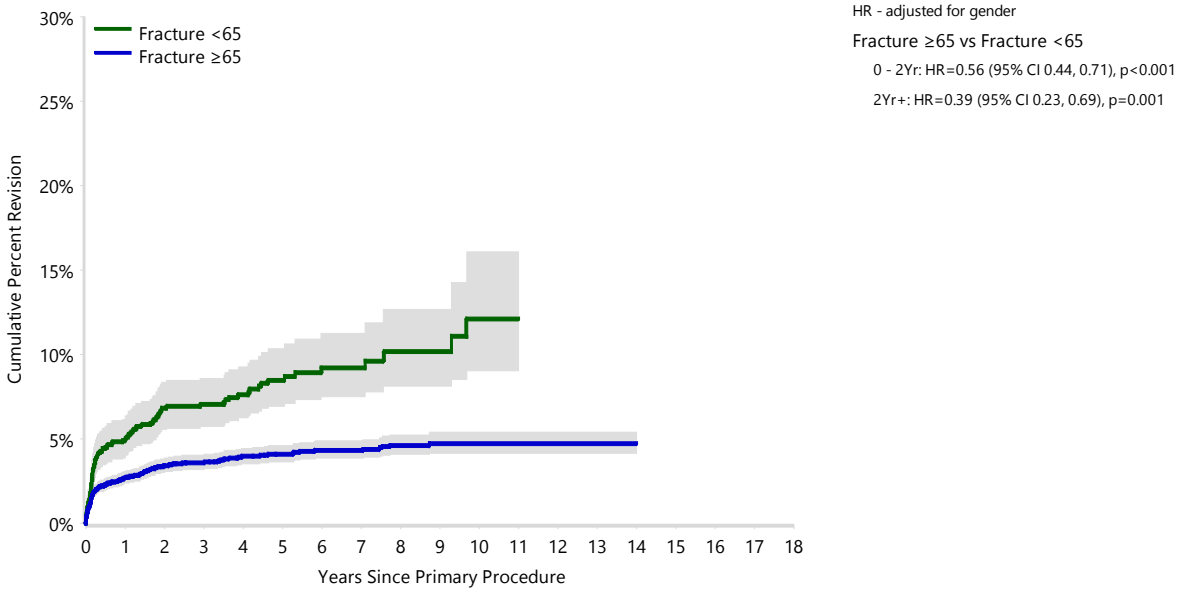
Figure SSR90 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Rotator Cuff Arthropathy	<65	2929	2353	1443	876	458	132	22
	≥65	21193	17634	12151	7690	4233	1434	181

Note: Restricted to modern prostheses

Figure SSR91 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Fracture)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	<65	1436	1139	746	432	227	68	18
	≥65	8153	6736	4542	2840	1589	521	57

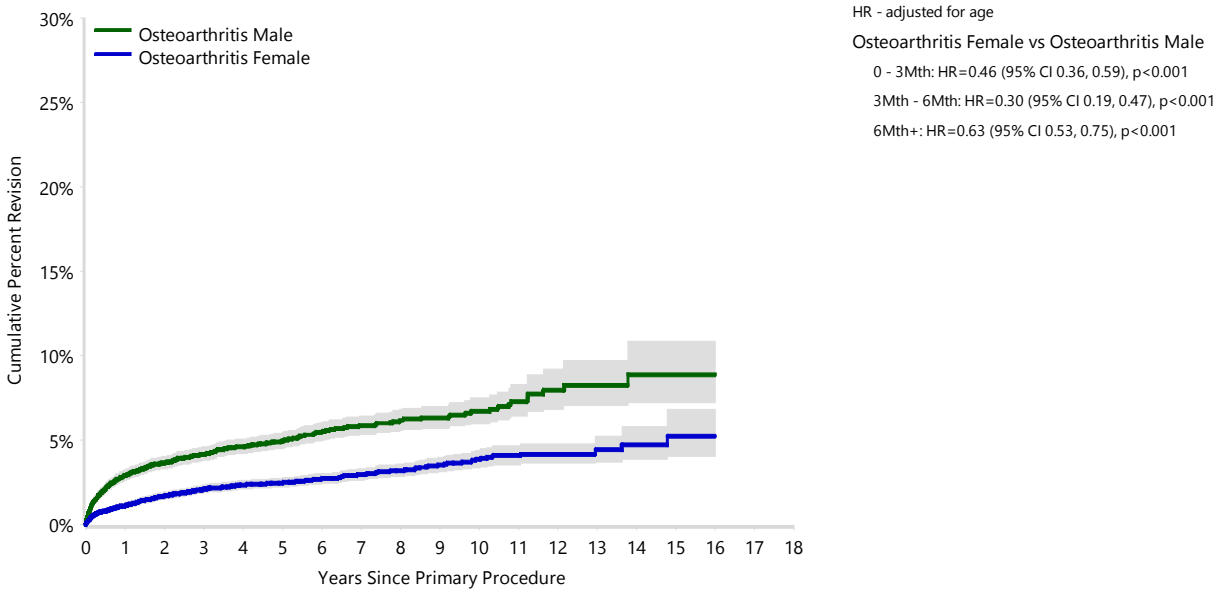
Note: Restricted to modern prostheses

Table SSR142 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Gender

Primary Diagnosis	Gender	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis									
	Male	508	11176	2.9 (2.6, 3.3)	4.2 (3.8, 4.6)	4.9 (4.5, 5.4)	5.9 (5.3, 6.4)	6.7 (6.0, 7.5)	8.9 (7.3, 10.9)
	Female	390	16758	1.1 (1.0, 1.3)	2.1 (1.9, 2.4)	2.5 (2.2, 2.8)	3.0 (2.6, 3.3)	3.9 (3.4, 4.4)	4.7 (3.9, 5.8)
Rotator Cuff Arthropathy									
	Male	560	11390	3.1 (2.8, 3.4)	4.7 (4.3, 5.2)	5.7 (5.2, 6.2)	6.6 (6.0, 7.2)	7.3 (6.6, 8.1)	7.7 (6.8, 8.8)
	Female	325	12732	1.5 (1.3, 1.8)	2.4 (2.2, 2.8)	2.9 (2.5, 3.2)	3.0 (2.7, 3.4)	3.9 (3.3, 4.4)	4.5 (3.7, 5.3)
Fracture									
	Male	136	1635	7.0 (5.9, 8.4)	8.4 (7.1, 9.9)	9.4 (7.9, 11.1)	9.4 (7.9, 11.1)	10.2 (8.4, 12.3)	
	Female	270	7954	2.2 (1.9, 2.6)	3.3 (2.9, 3.7)	3.8 (3.4, 4.3)	4.2 (3.7, 4.7)	4.9 (4.2, 5.7)	4.9 (4.2, 5.7)
TOTAL		**2189**	**61645**						

Note: Restricted to modern prostheses

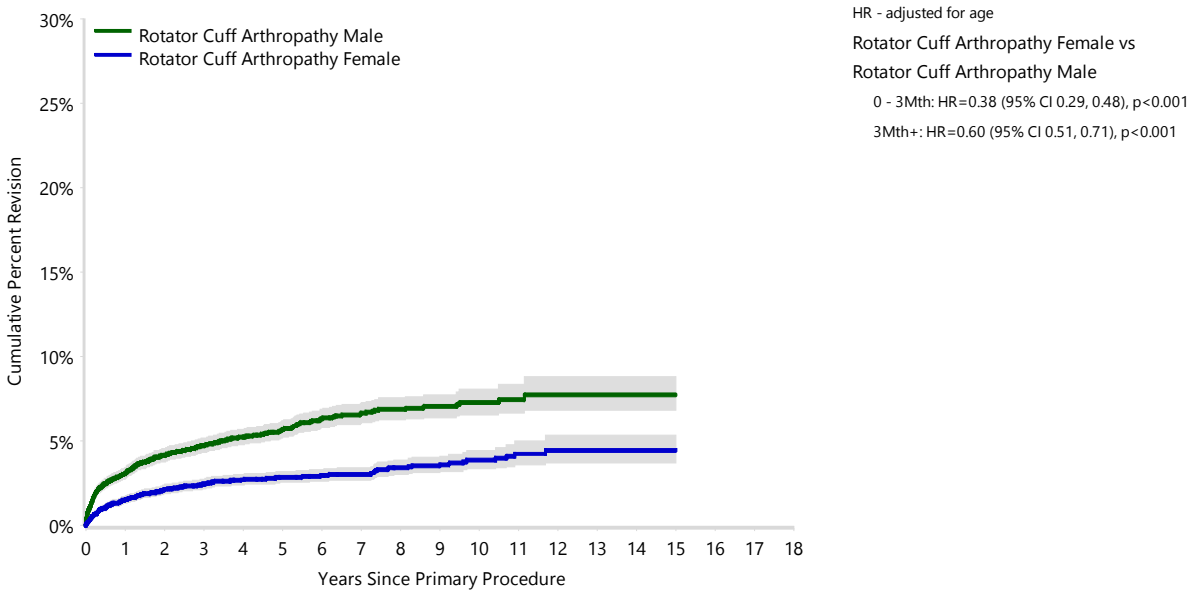
Figure SSR92 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	Male	11176	9224	6333	4010	2202	790	131
	Female	16758	14128	10103	6740	3953	1445	257

Note: Restricted to modern prostheses

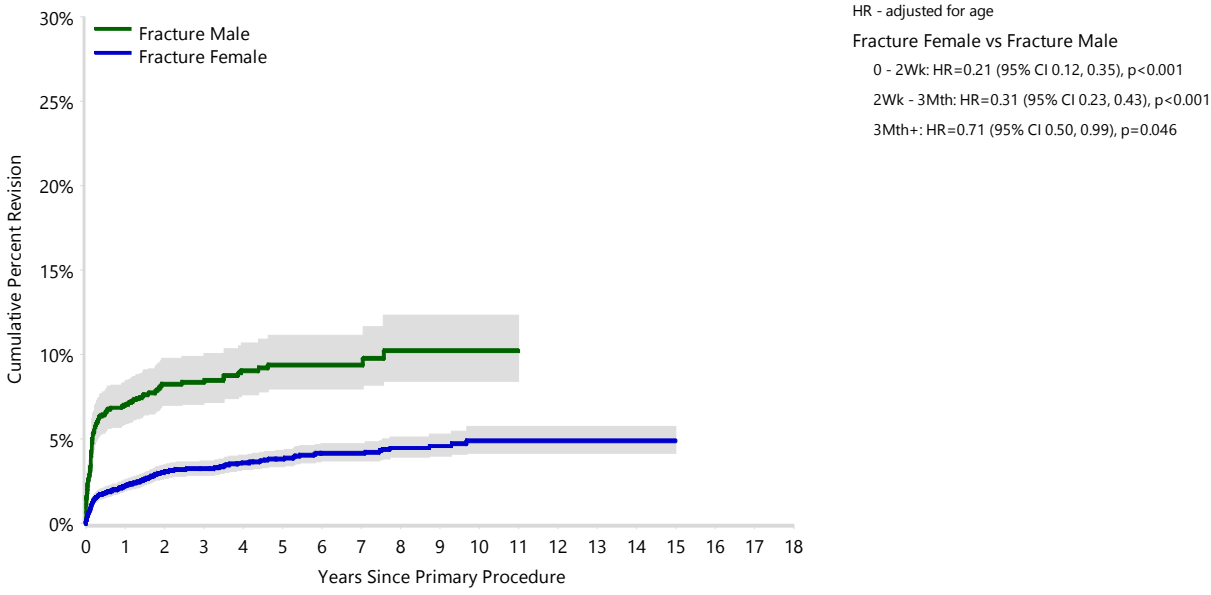
Figure SSR93 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Rotator Cuff Arthropathy	Male	11390	9254	6109	3662	1905	593	72
	Female	12732	10733	7485	4904	2786	973	131

Note: Restricted to modern prostheses

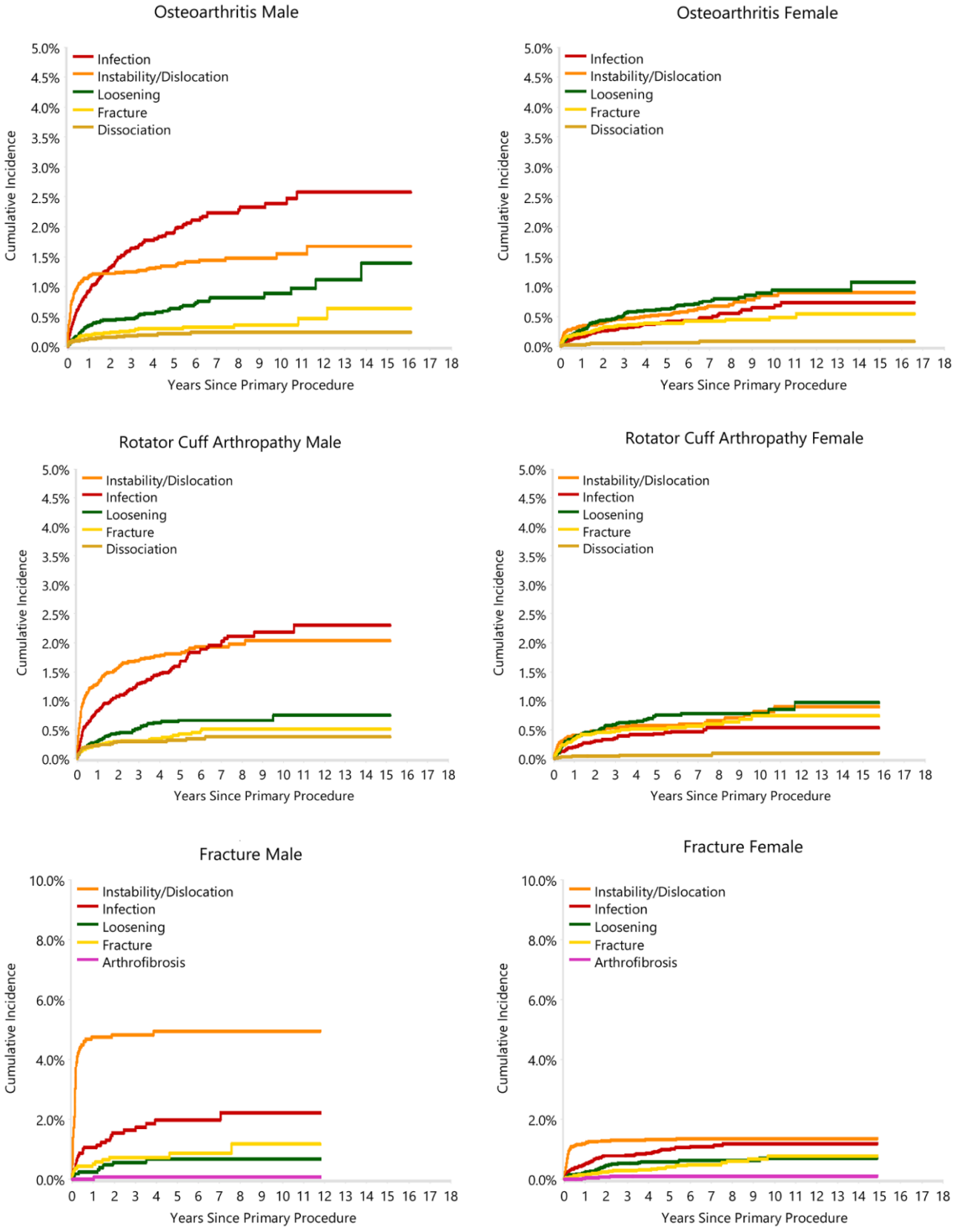
Figure SSR94 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Fracture)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	Male	1635	1240	769	447	257	82	12
	Female	7954	6635	4519	2825	1559	507	63

Note: Restricted to modern prostheses

Figure SSR95 **Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Anatomic Shoulder Replacement by Primary Diagnosis and Gender**



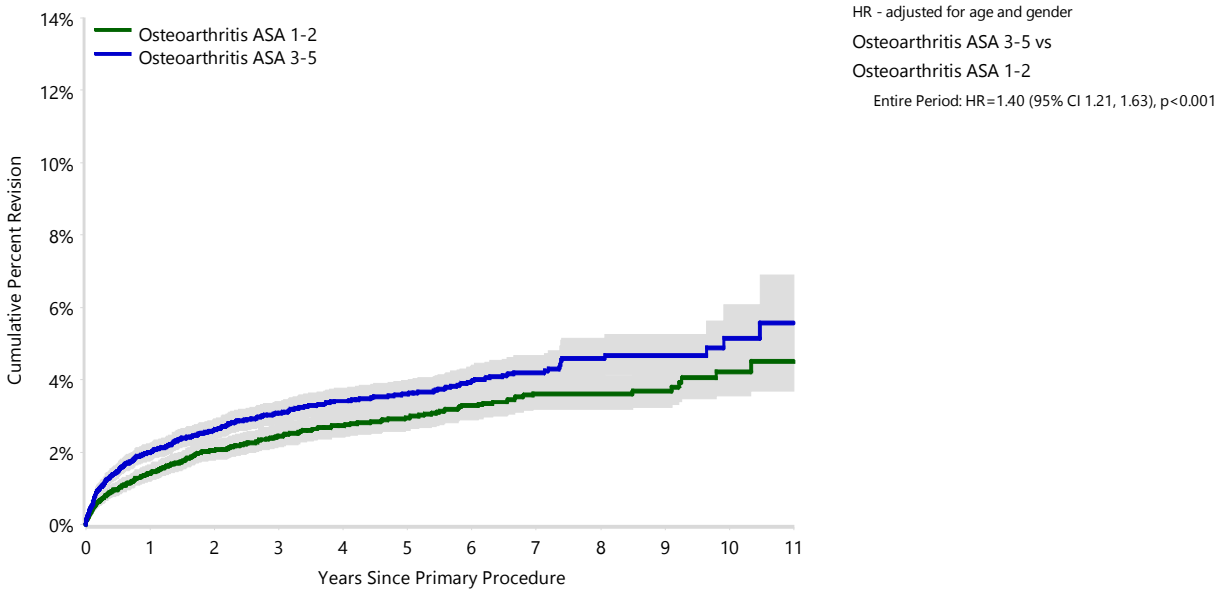
Note: Restricted to modern prostheses

Table SSR143 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and ASA Score

Primary Diagnosis	ASA Score	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	8 Yrs	10 Yrs
Osteoarthritis									
	ASA 1-2	291	11139	1.4 (1.2, 1.7)	2.1 (1.8, 2.4)	2.5 (2.2, 2.8)	3.0 (2.6, 3.3)	3.6 (3.2, 4.1)	4.2 (3.6, 5.0)
	ASA 3-5	438	14104	2.0 (1.8, 2.2)	2.6 (2.4, 2.9)	3.1 (2.8, 3.4)	3.6 (3.3, 4.0)	4.6 (4.1, 5.2)	5.1 (4.4, 6.1)
Rotator Cuff Arthropathy									
	ASA 1-2	305	9797	2.0 (1.7, 2.3)	2.6 (2.3, 3.0)	3.0 (2.6, 3.4)	3.6 (3.2, 4.0)	4.4 (3.8, 5.0)	4.8 (4.1, 5.6)
	ASA 3-5	470	12543	2.5 (2.2, 2.7)	3.4 (3.1, 3.7)	3.9 (3.6, 4.3)	4.5 (4.1, 4.9)	5.2 (4.7, 5.8)	5.3 (4.8, 6.0)
Fracture									
	ASA 1-2	123	3305	2.5 (2.0, 3.1)	3.4 (2.8, 4.1)	3.6 (3.0, 4.3)	4.4 (3.6, 5.2)	4.8 (3.9, 5.7)	4.8 (3.9, 5.7)
	ASA 3-5	239	5442	3.4 (2.9, 3.9)	4.3 (3.7, 4.9)	4.5 (3.9, 5.1)	5.1 (4.5, 5.8)	5.5 (4.7, 6.3)	6.4 (5.0, 8.0)
TOTAL		**1866**	**56330**						

Note: Restricted to modern prostheses

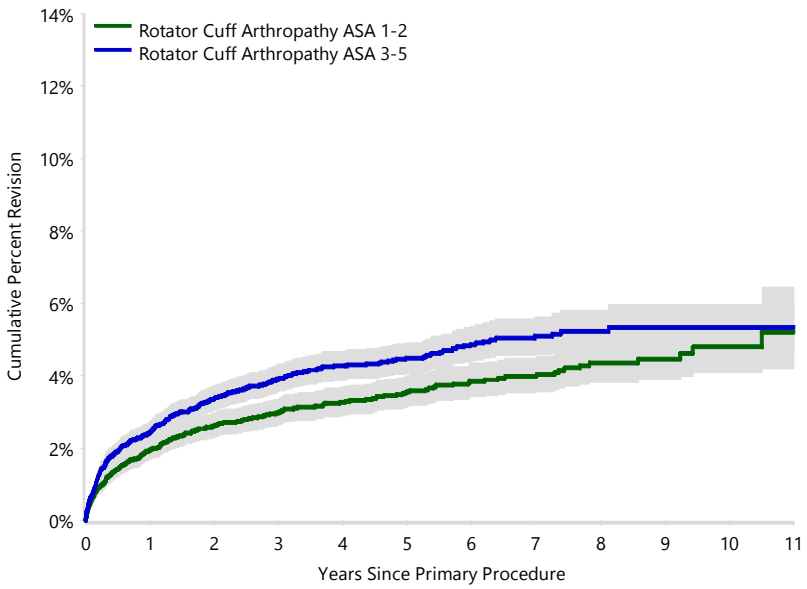
Figure SSR96 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	5 Yrs	8 Yrs	10 Yrs
Osteoarthritis	ASA 1-2	11139	9319	7804	6568	4243	1483	474
	ASA 3-5	14102	11467	9238	7472	4328	1234	348

Note: Restricted to modern prostheses

Figure SSR97 **Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and ASA Score (Primary Diagnosis Rotator Cuff Arthropathy)**



HR - adjusted for age and gender

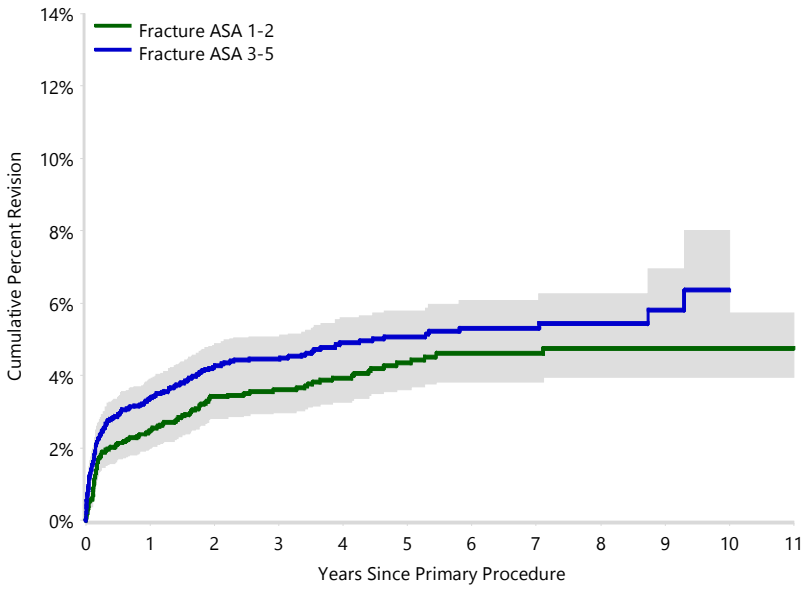
Rotator Cuff Arthropathy ASA 3-5 vs Rotator Cuff Arthropathy ASA 1-2

Entire Period: HR=1.35 (95% CI 1.17, 1.56), p<0.001

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	5 Yrs	8 Yrs	10 Yrs
Rotator Cuff Arthropathy	ASA 1-2	9797	8128	6723	5619	3542	1161	347
	ASA 3-5	12542	10148	8060	6381	3583	953	286

Note: Restricted to modern prostheses

Figure SSR98 **Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and ASA Score (Primary Diagnosis Fracture)**



HR - adjusted for age and gender

Fracture ASA 3-5 vs Fracture ASA 1-2

Entire Period: HR=1.33 (95% CI 1.07, 1.66), p=0.011

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	5 Yrs	8 Yrs	10 Yrs
Fracture	ASA 1-2	3305	2742	2303	1907	1198	396	128
	ASA 3-5	5441	4355	3462	2689	1471	408	105

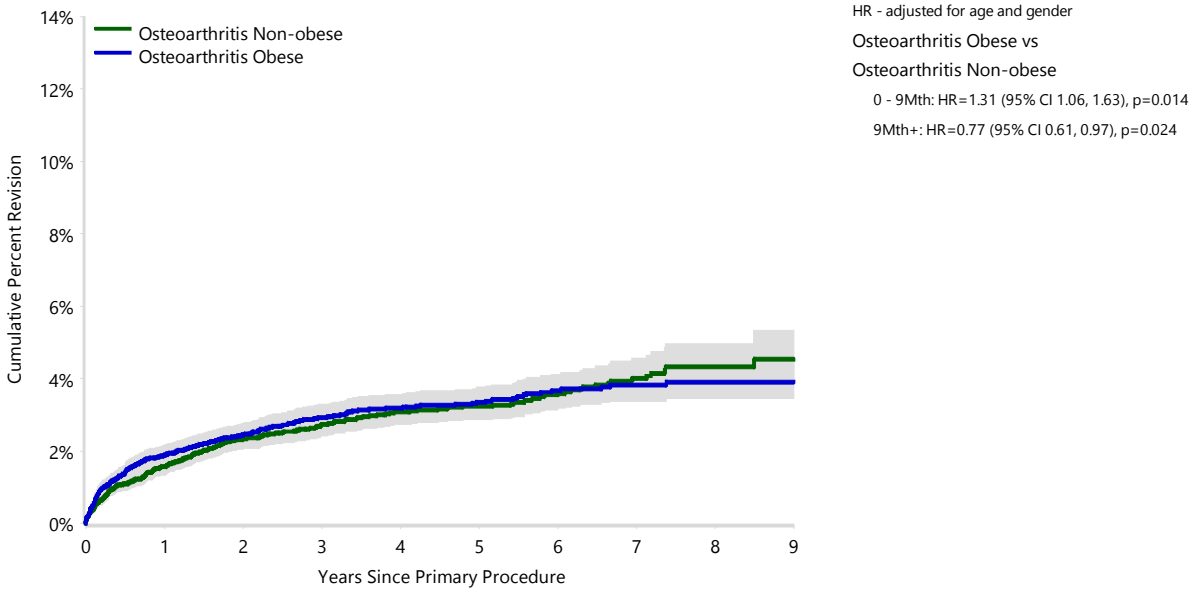
Note: Restricted to modern prostheses

Table SSR144 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and BMI Category

Primary Diagnosis	BMI Category	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Osteoarthritis									
	Non-obese	309	11354	1.6 (1.3, 1.8)	2.3 (2.0, 2.6)	2.7 (2.4, 3.1)	3.1 (2.7, 3.5)	3.2 (2.9, 3.7)	3.6 (3.2, 4.1)
	Obese	324	11591	1.9 (1.6, 2.2)	2.4 (2.2, 2.8)	2.9 (2.6, 3.3)	3.2 (2.8, 3.6)	3.4 (3.0, 3.8)	3.7 (3.3, 4.1)
Rotator Cuff Arthropathy									
	Non-obese	316	10991	1.9 (1.6, 2.2)	2.7 (2.4, 3.0)	3.0 (2.7, 3.4)	3.2 (2.9, 3.6)	3.4 (3.0, 3.8)	3.7 (3.3, 4.2)
	Obese	362	9552	2.5 (2.2, 2.8)	3.3 (3.0, 3.7)	3.9 (3.5, 4.3)	4.3 (3.9, 4.8)	4.6 (4.2, 5.2)	5.0 (4.5, 5.6)
Fracture									
	Non-obese	128	3786	2.5 (2.0, 3.0)	3.3 (2.8, 4.0)	3.4 (2.8, 4.1)	3.7 (3.1, 4.4)	4.0 (3.4, 4.9)	4.4 (3.6, 5.3)
	Obese	155	3059	3.8 (3.2, 4.6)	4.9 (4.2, 5.8)	5.2 (4.5, 6.2)	5.8 (5.0, 6.8)	6.1 (5.2, 7.2)	6.1 (5.2, 7.2)
TOTAL		**1594**	**50333**						

Note: BMI has not been presented for patients aged ≤19 years
Restricted to modern prostheses

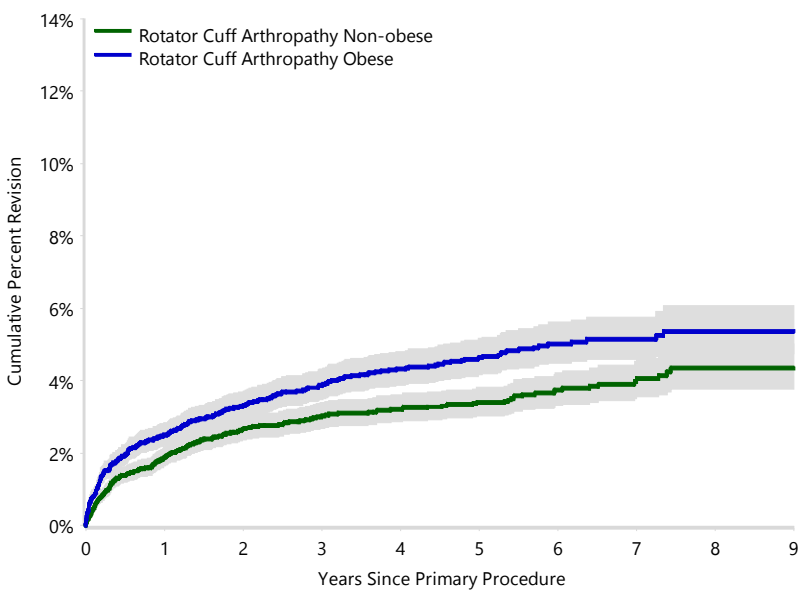
Figure SSR99 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Osteoarthritis	Non-obese	11354	9255	7414	5993	4587	3437	2356
	Obese	11591	9341	7533	6054	4622	3379	2264

Note: BMI has not been presented for patients aged ≤19 years
Restricted to modern prostheses

Figure SSR100 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis Rotator Cuff Arthropathy)



HR - adjusted for age and gender

Rotator Cuff Arthropathy Obese vs Rotator Cuff Arthropathy Non-obese

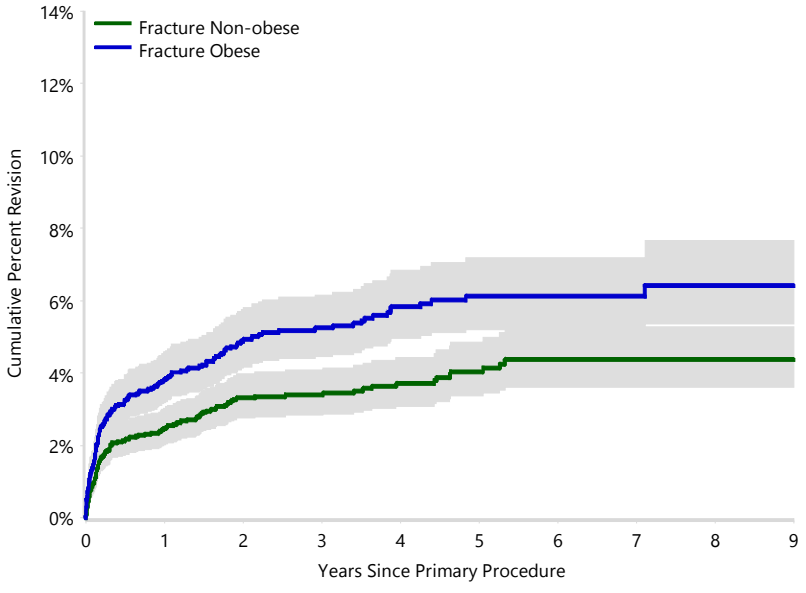
0 - 3Mth: HR=1.61 (95% CI 1.25, 2.09), p<0.001

3Mth+: HR=1.16 (95% CI 0.96, 1.41), p=0.118

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Rotator Cuff Arthropathy	Non-obese	10991	8870	7049	5582	4220	3141	2116
	Obese	9552	7719	6128	4903	3666	2656	1775

Note: BMI has not been presented for patients aged ≤19 years. Restricted to modern prostheses

Figure SSR101 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis Fracture)



HR - adjusted for age and gender

Fracture Obese vs Fracture Non-obese

Entire Period: HR=1.38 (95% CI 1.09, 1.76), p=0.007

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Fracture	Non-obese	3786	3018	2371	1813	1369	978	654
	Obese	3059	2433	1948	1535	1143	811	580

Note: BMI has not been presented for patients aged ≤19 years. Restricted to modern prostheses

Table SSR145 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Glenoid Morphology

Primary Diagnosis	Glenoid Morphology	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis								
	A1	122	4786	1.6 (1.3, 2.1)	2.4 (2.0, 3.0)	2.8 (2.3, 3.4)	3.1 (2.5, 3.7)	3.3 (2.7, 3.9)
	A2	123	4533	1.6 (1.3, 2.1)	2.6 (2.2, 3.2)	3.1 (2.6, 3.8)	3.3 (2.7, 3.9)	3.4 (2.9, 4.2)
	B1	69	3133	1.7 (1.3, 2.3)	2.1 (1.7, 2.8)	2.4 (1.9, 3.1)	2.7 (2.1, 3.5)	2.7 (2.1, 3.5)
	B2	93	3740	1.4 (1.1, 1.9)	1.9 (1.5, 2.5)	2.7 (2.2, 3.4)	3.4 (2.7, 4.3)	3.6 (2.9, 4.5)
	C	34	1231	1.8 (1.2, 2.8)	2.4 (1.6, 3.5)	2.7 (1.9, 3.9)	3.2 (2.3, 4.6)	4.2 (2.9, 6.1)
Rotator Cuff Arthropathy								
	A1	262	8336	2.1 (1.8, 2.4)	2.8 (2.5, 3.3)	3.3 (2.9, 3.8)	3.8 (3.3, 4.3)	4.0 (3.5, 4.5)
	A2	129	4046	2.3 (1.8, 2.8)	3.3 (2.8, 4.0)	3.6 (3.0, 4.3)	3.8 (3.2, 4.5)	3.9 (3.3, 4.7)
	B1	65	2364	1.9 (1.4, 2.6)	2.8 (2.1, 3.6)	3.1 (2.4, 4.0)	3.1 (2.4, 4.0)	3.5 (2.6, 4.6)
	B2	51	1806	1.9 (1.4, 2.7)	2.6 (1.9, 3.5)	3.2 (2.4, 4.3)	3.6 (2.7, 4.8)	3.9 (2.9, 5.2)
	C	20	673	2.3 (1.4, 3.8)	2.9 (1.8, 4.6)	3.2 (2.0, 5.0)	3.2 (2.0, 5.0)	4.5 (2.7, 7.5)
Fracture								
	A1	181	4792	3.0 (2.5, 3.5)	3.9 (3.3, 4.5)	4.0 (3.5, 4.7)	4.3 (3.7, 5.0)	4.7 (4.0, 5.5)
	A2	19	518	2.4 (1.4, 4.2)	3.6 (2.2, 5.9)	3.6 (2.2, 5.9)	4.8 (2.9, 7.8)	4.8 (2.9, 7.8)
	B1	9	248	3.0 (1.4, 6.1)	3.7 (1.8, 7.5)	3.7 (1.8, 7.5)	4.9 (2.4, 9.8)	4.9 (2.4, 9.8)
	B2	8	148	3.5 (1.5, 8.3)	5.5 (2.6, 11.3)	5.5 (2.6, 11.3)	7.0 (3.4, 14.0)	
	C	1	55	1.9 (0.3, 12.9)	1.9 (0.3, 12.9)	1.9 (0.3, 12.9)	1.9 (0.3, 12.9)	1.9 (0.3, 12.9)
TOTAL		**1186**	**40409**					

Note: Restricted to modern prostheses

Excludes 119 procedures with a recorded glenoid morphology of B3

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OUTCOME FOR OSTEOARTHRITIS, ROTATOR CUFF ARTHROPATHY AND FRACTURE – PROSTHESIS CHARACTERISTICS

Fixation

Fixation of either the glenoid or humeral components are not risk factors for revision of total stemmed reverse shoulder replacement procedures when undertaken for osteoarthritis or fracture. Cementing the glenoid component increases the rate of revision compared to cementless fixation for the primary diagnosis rotator cuff arthropathy (Table SSR146 and Figure SSR102).

Polyethylene Type and Bearing Surface

Non XLPE glenospheres increase the risk of revision in procedures for osteoarthritis but not rotator cuff arthropathy or fracture. Non XLPE humeral cups have an increased rate of revision compared to XLPE humeral cups for osteoarthritis only (Table SSR147 and Figure SSR103).

Glenosphere Size

Glenosphere sizes >40mm have a lower rate of revision compared to <38mm over the entire period for osteoarthritis, in contrast to fracture where <38mm humeral heads have the lower revision rate compared to >40mm (Table SSR148, Figure SSR104 and Figure SSR105). Varying glenosphere size does not change the rate of revision in total stemmed reverse procedures for rotator cuff arthropathy.

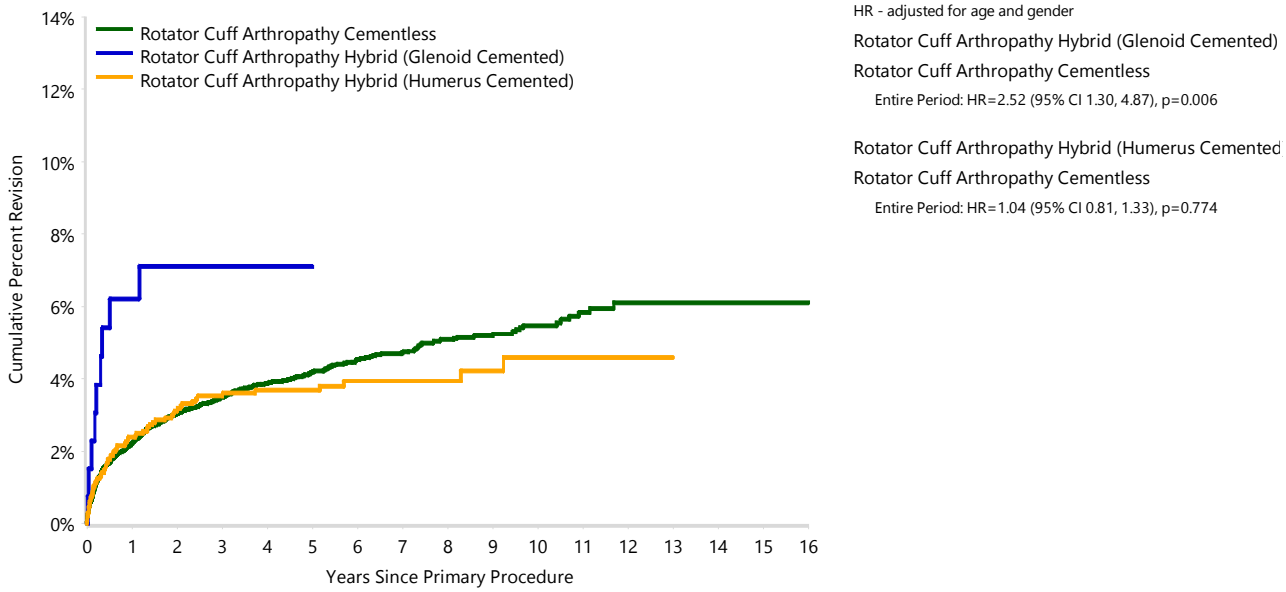
Glenosphere sizes <38mm have a higher rate of revision compared to sizes >40mm.

Table SSR146 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Fixation

Primary Diagnosis	Fixation	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis								
	Cemented	4	113	0.9 (0.1, 6.1)	1.9 (0.5, 7.4)	1.9 (0.5, 7.4)	1.9 (0.5, 7.4)	3.2 (1.0, 9.8)
	Cementless	785	24803	1.8 (1.7, 2.0)	2.5 (2.3, 2.7)	2.9 (2.7, 3.2)	3.3 (3.0, 3.5)	3.5 (3.2, 3.7)
	Hybrid (Glenoid Cemented)	5	115	1.8 (0.5, 7.1)	2.8 (0.9, 8.6)	2.8 (0.9, 8.6)	4.5 (1.6, 11.9)	4.5 (1.6, 11.9)
	Hybrid (Humerus Cemented)	104	2903	1.9 (1.4, 2.4)	2.7 (2.2, 3.4)	3.1 (2.5, 3.8)	3.3 (2.7, 4.1)	3.4 (2.8, 4.2)
Rotator Cuff Arthropathy								
	Cemented	4	32	6.4 (1.6, 23.1)	6.4 (1.6, 23.1)	6.4 (1.6, 23.1)	10.4 (3.4, 29.2)	10.4 (3.4, 29.2)
	Cementless	803	22007	2.2 (2.0, 2.4)	3.1 (2.8, 3.3)	3.5 (3.2, 3.8)	3.9 (3.6, 4.2)	4.2 (3.9, 4.5)
	Hybrid (Glenoid Cemented)	9	132	6.2 (3.2, 12.1)	7.1 (3.8, 13.2)	7.1 (3.8, 13.2)	7.1 (3.8, 13.2)	7.1 (3.8, 13.2)
	Hybrid (Humerus Cemented)	69	1951	2.4 (1.8, 3.2)	3.1 (2.4, 4.0)	3.5 (2.8, 4.5)	3.7 (2.9, 4.7)	3.7 (2.9, 4.7)
Fracture								
	Cemented	6	120	3.4 (1.3, 8.8)	3.4 (1.3, 8.8)	3.4 (1.3, 8.8)	5.1 (2.0, 12.3)	7.1 (3.0, 16.1)
	Cementless	140	2921	3.6 (2.9, 4.3)	4.6 (3.8, 5.4)	4.7 (4.0, 5.6)	5.0 (4.2, 5.9)	5.3 (4.4, 6.2)
	Hybrid (Glenoid Cemented)	12	184	5.6 (3.0, 10.1)	6.3 (3.5, 11.1)	6.3 (3.5, 11.1)	7.7 (4.3, 13.5)	
	Hybrid (Humerus Cemented)	248	6364	2.7 (2.4, 3.2)	3.6 (3.1, 4.1)	3.8 (3.3, 4.3)	4.2 (3.7, 4.8)	4.4 (3.9, 5.0)
TOTAL		**2189**	**61645**					

Note: Restricted to modern prostheses. Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR102 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Fixation (Primary Diagnosis Rotator Cuff Arthropathy)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Rotator Cuff Arthropathy	Cementless	22007	18155	14833	12196	9695	7655
	Hybrid (Glenoid Cemented)	132	108	97	88	74	52
	Hybrid (Humerus Cemented)	1951	1696	1479	1286	1049	843

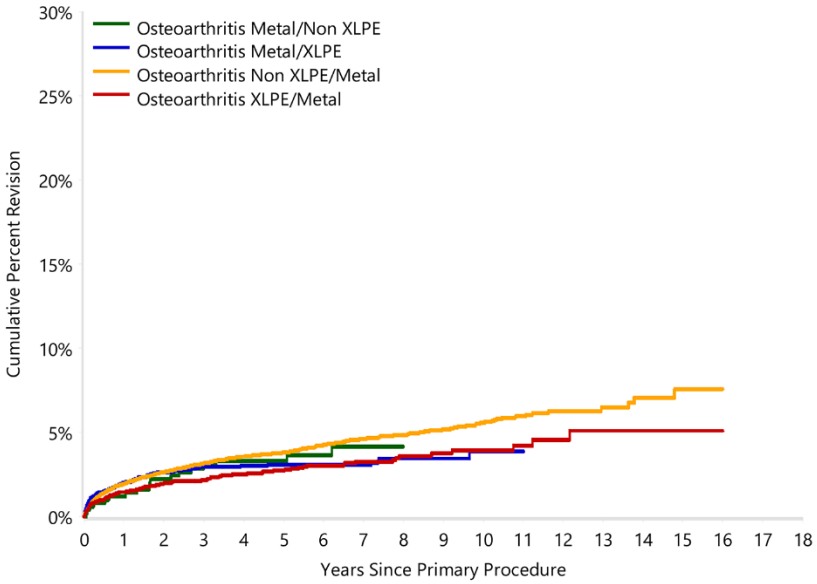
Note: Restricted to modern prostheses. Only combinations with >100 procedures have been listed

Table SSR147 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Bearing Surface

Primary Diagnosis	Bearing Surface	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis									
	Ceramic/Non XLPE	0	5	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
	Ceramic/XLPE	3	75	1.4 (0.2, 9.6)	4.7 (1.5, 13.9)				
	Metal/Non XLPE	19	502	1.2 (0.5, 2.7)	3.1 (1.9, 5.1)	3.3 (2.0, 5.3)	4.2 (2.6, 6.7)		
	Metal/XLPE	128	4490	2.0 (1.6, 2.4)	2.9 (2.5, 3.5)	3.1 (2.6, 3.7)	3.1 (2.6, 3.7)	3.9 (2.9, 5.1)	
	Non XLPE/Metal	604	16522	2.0 (1.8, 2.2)	3.2 (2.9, 3.5)	3.8 (3.5, 4.1)	4.6 (4.2, 5.0)	5.6 (5.0, 6.1)	7.1 (6.0, 8.3)
	XLPE/Metal	144	6331	1.5 (1.2, 1.8)	2.2 (1.8, 2.6)	2.7 (2.3, 3.3)	3.3 (2.7, 4.0)	3.9 (3.2, 4.9)	5.1 (3.7, 7.0)
Rotator Cuff Arthropathy									
	Ceramic/Non XLPE	0	10	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
	Ceramic/XLPE	1	71	0.0 (0.0, 0.0)	1.5 (0.2, 10.3)	1.5 (0.2, 10.3)			
	Metal/Non XLPE	22	467	2.4 (1.3, 4.2)	3.9 (2.5, 6.1)	4.7 (3.1, 7.2)	6.0 (3.5, 10.1)		
	Metal/XLPE	139	3804	2.5 (2.0, 3.1)	3.6 (3.0, 4.2)	3.8 (3.2, 4.5)	4.3 (3.6, 5.1)	4.9 (3.8, 6.2)	
	Non XLPE/Metal	579	14493	2.3 (2.1, 2.6)	3.7 (3.4, 4.0)	4.4 (4.0, 4.8)	4.9 (4.5, 5.4)	5.8 (5.2, 6.4)	6.3 (5.5, 7.0)
	XLPE/Metal	144	5265	1.9 (1.6, 2.3)	2.9 (2.5, 3.5)	3.7 (3.1, 4.5)	4.1 (3.3, 4.9)	4.8 (3.8, 6.2)	5.9 (4.3, 8.1)
Fracture									
	Ceramic/XLPE	0	4	0.0 (0.0, 0.0)					
	Metal/Non XLPE	13	285	1.8 (0.7, 4.2)	3.6 (2.0, 6.7)	5.0 (2.9, 8.6)	5.0 (2.9, 8.6)		
	Metal/XLPE	85	1592	4.0 (3.2, 5.2)	5.4 (4.3, 6.7)	5.7 (4.6, 7.1)	6.1 (4.9, 7.6)	6.1 (4.9, 7.6)	
	Non XLPE/Metal	242	5631	3.0 (2.5, 3.4)	4.0 (3.5, 4.6)	4.7 (4.2, 5.4)	5.1 (4.5, 5.8)	6.2 (5.3, 7.4)	6.2 (5.3, 7.4)
	XLPE/Metal	65	2065	2.7 (2.1, 3.5)	3.4 (2.7, 4.4)	3.8 (3.0, 4.9)	3.8 (3.0, 4.9)	3.8 (3.0, 4.9)	
TOTAL		**2188**	**61612**						

Note: Restricted to modern prostheses. Reported as humeral cup/glenosphere. Excludes procedures with unknown bearing surface
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR103 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Bearing Surface (Primary Diagnosis OA)



HR – adjusted for age and gender

Osteoarthritis Metal/XLPE vs
Osteoarthritis Metal/Non XLPE
0-1.5 Yr: HR=1.35 (95% CI 0.66, 2.78), p=0.412
1.5 Yr +: HR=0.31 (95% CI 0.15, 0.63), p=0.001

Osteoarthritis XLPE/Metal vs
Osteoarthritis Non XLPE/Metal
Entire Period: HR= 0.75 (95% CI 0.62, 0.90), p=0.001

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	Metal/Non XLPE	502	484	447	281	146	7	0
	Metal/XLPE	4490	3921	2896	1837	864	192	4
	Non XLPE/Metal	16522	14111	10166	6883	4086	1595	265
	XLPE/Metal	6331	4764	2890	1739	1055	440	119

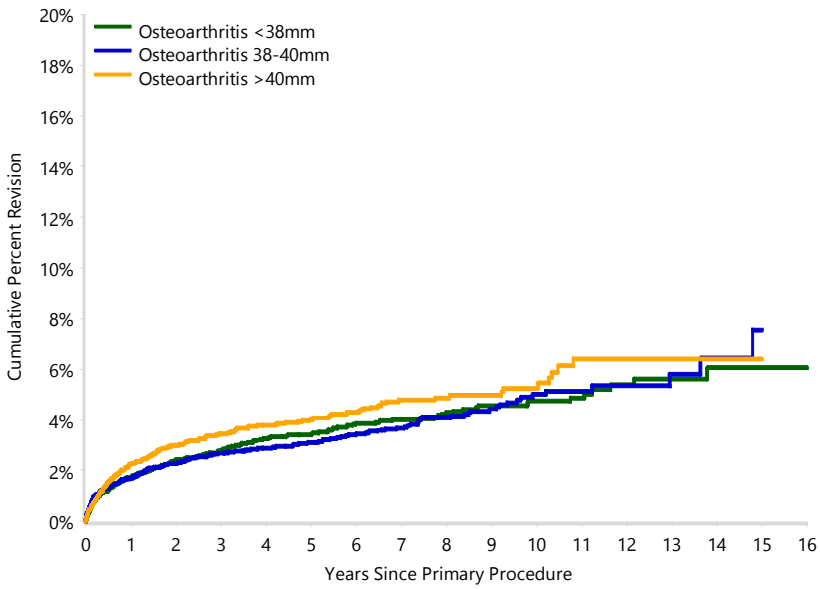
Note: Restricted to modern prostheses. Reported as humeral cup/glenosphere.

Table SSR148 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenosphere Size (Primary Diagnosis OA)

Primary Diagnosis	Glenosphere Size	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	8 Yrs	10 Yrs
Osteoarthritis									
	<38mm	306	9868	1.7 (1.5, 2.0)	2.4 (2.1, 2.8)	2.8 (2.5, 3.2)	3.4 (3.0, 3.9)	4.3 (3.8, 4.9)	4.7 (4.1, 5.4)
	38-40mm	314	10127	1.7 (1.4, 2.0)	2.3 (2.0, 2.6)	2.7 (2.4, 3.0)	3.1 (2.7, 3.5)	4.1 (3.6, 4.6)	5.0 (4.3, 5.8)
	>40mm	237	6199	2.3 (1.9, 2.7)	3.0 (2.6, 3.5)	3.5 (3.0, 4.0)	4.0 (3.5, 4.6)	4.9 (4.2, 5.6)	5.3 (4.5, 6.1)
Rotator Cuff Arthropathy									
	<38mm	283	8378	2.1 (1.8, 2.5)	2.9 (2.5, 3.3)	3.3 (2.9, 3.8)	4.0 (3.5, 4.5)	4.7 (4.1, 5.4)	5.5 (4.7, 6.5)
	38-40mm	314	8635	2.3 (2.0, 2.6)	3.1 (2.7, 3.5)	3.4 (3.1, 3.9)	4.0 (3.5, 4.5)	4.7 (4.2, 5.3)	4.8 (4.2, 5.4)
	>40mm	250	5811	2.4 (2.1, 2.9)	3.4 (3.0, 3.9)	3.9 (3.4, 4.4)	4.6 (4.1, 5.3)	5.8 (5.1, 6.7)	6.2 (5.3, 7.2)
Fracture									
	<38mm	135	4078	2.3 (1.8, 2.8)	3.0 (2.5, 3.7)	3.2 (2.7, 3.8)	3.8 (3.2, 4.6)	4.7 (3.9, 5.7)	4.7 (3.9, 5.7)
	38-40mm	153	3658	3.1 (2.6, 3.7)	3.8 (3.2, 4.5)	4.0 (3.4, 4.7)	4.5 (3.8, 5.3)	5.0 (4.2, 5.9)	5.9 (4.7, 7.4)
	>40mm	105	1442	5.1 (4.1, 6.4)	6.6 (5.4, 8.1)	7.0 (5.7, 8.5)	8.0 (6.6, 9.6)	8.6 (7.0, 10.4)	8.6 (7.0, 10.4)
TOTAL		2097	58196						

Note: Excludes procedures with unknown glenosphere sizes
Restricted to modern prostheses
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR104 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenosphere Size (Primary Diagnosis OA)



HR - adjusted for age and gender

Osteoarthritis <38mm vs Osteoarthritis 38-40mm
Entire Period: HR=1.09 (95% CI 0.93, 1.27), p=0.304

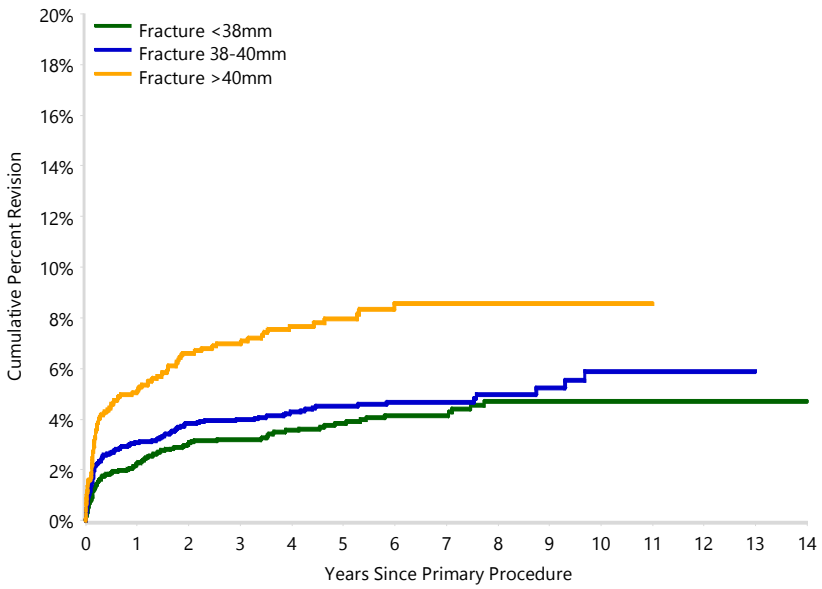
Osteoarthritis >40mm vs Osteoarthritis <38mm
Entire Period: HR=0.79 (95% CI 0.65, 0.94), p=0.009

Osteoarthritis >40mm vs Osteoarthritis 38-40mm
0 - 3Mth: HR=0.65 (95% CI 0.48, 0.89), p=0.007
3Mth+: HR=0.94 (95% CI 0.77, 1.15), p=0.568

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	<38mm	9868	8140	5648	3739	2261	951	198
	38-40mm	10127	8762	6411	4262	2437	807	128
	>40mm	6199	5372	3979	2651	1457	477	62

Note: Restricted to modern prostheses

Figure SSR105 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenosphere Size (Primary Diagnosis Fracture)



HR - adjusted for age and gender

Fracture 38-40mm vs Fracture <38mm

Entire Period: HR=1.18 (95% CI 0.94, 1.49), p=0.160

Fracture >40mm vs Fracture <38mm

Entire Period: HR=1.46 (95% CI 1.11, 1.92), p=0.007

Fracture >40mm vs Fracture 38-40mm

Entire Period: HR=1.24 (95% CI 0.95, 1.62), p=0.118

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture	<38mm	4078	3297	2126	1309	780	284	47
	38-40mm	3658	3117	2221	1411	758	223	23
	>40mm	1442	1221	892	547	277	81	5

Note: Restricted to modern prostheses

IMPLANT SIZING VARIATIONS (ISV)

ISV are modifications to a prosthesis design range beyond simple size change.

Glenoid Baseplate Augmentation

A glenoid baseplate is categorised as augmented if the backside has been modified for glenoid deformity (eg. wedged, stepped, angulated, or lateralised). When stratified by primary diagnosis, there is no difference in the rate of revision when augmented and non-augmented glenoid baseplates are compared amongst all common primary diagnoses except for osteoarthritis in the first 3 months, where a non-augmented glenoid is at higher revision risk (Table SSR149 and Figure SSR106).

When stratified by glenoid morphology, glenoid base plate augmentation varies with differing primary diagnoses. In osteoarthritis, while there is no difference when utilised for type A glenoids, glenoid morphology B augmented glenoid replacement has a higher rate of revision from 9 months onwards with no difference prior to this time (Table SSR150 and Figure SSR107). In contrast, glenoid morphology C non-augmented glenoid replacement has a higher rate of revision for the entire period (Table SSR150 and Figure SSR108). Glenoid morphology B non-augmented glenoid for rotator cuff arthropathy has a higher rate of revision for the first month only, with no difference after this time (Table SSR150 and Figure SSR109).

Humeral, Stem Type and Stem Length

There is an increased rate of revision for non-fracture humeral stems compared to fracture humeral stems (Table SSR151 and Figure SSR110). When compared by fixation, a cemented fracture stem has a lower rate of revision than a cemented non fracture stem (Table SSR152 and Figure SSR111). There is no difference in the rate of revision when cementless fixation stems are used.

A short humeral stem (<100 mm) has a lower rate of revision compared to a conventional stem (≥100mm) from 3 months onwards in osteoarthritis patients only (Table SSR153 and Figure SSR112). Conventional stem lengths have higher cumulative incidence of infection compared to short stems (Figure SSR113).

Glenosphere Lateralisation

If the radius of curvature of the articular surface of the glenosphere is displaced laterally by design, it is categorised as a lateralised glenosphere. There is no difference in the rate of revision for total stemmed reverse shoulder replacements with lateralised glenospheres when compared to total stemmed reverse shoulder replacements with standard glenospheres for all primary diagnoses analysed (Table SSR154).

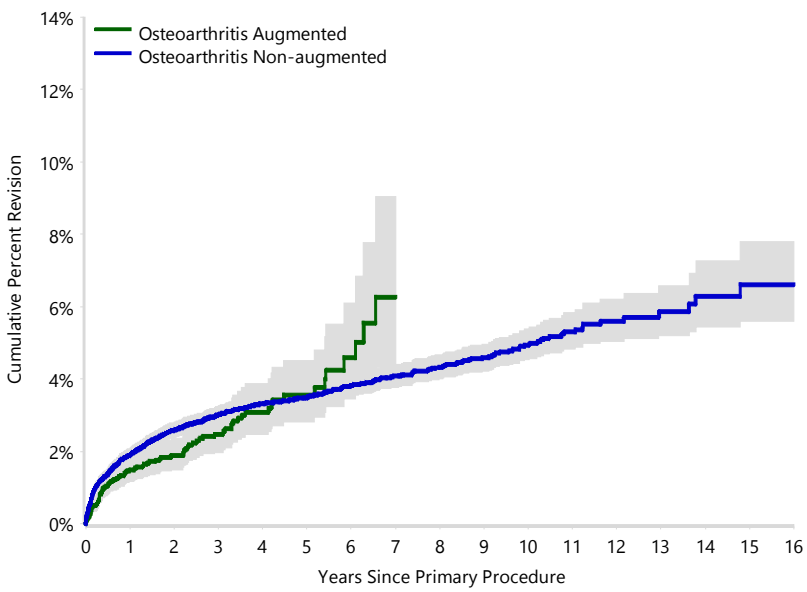
Table SSR149 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Glenoid Augmentation

Primary Diagnosis	Glenoid Augmentation	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis								
	Augmented	105	4765	1.5 (1.2, 1.9)	1.9 (1.5, 2.4)	2.5 (2.0, 3.1)	3.1 (2.5, 3.9)	3.6 (2.8, 4.5)
	Non-augmented	792	23154	1.9 (1.7, 2.1)	2.6 (2.4, 2.8)	3.0 (2.8, 3.3)	3.3 (3.1, 3.6)	3.5 (3.2, 3.8)
Rotator Cuff Arthropathy								
	Augmented	93	3800	1.9 (1.5, 2.4)	2.7 (2.2, 3.4)	3.0 (2.4, 3.7)	3.2 (2.5, 4.0)	3.4 (2.7, 4.5)
	Non-augmented	792	20316	2.3 (2.1, 2.6)	3.1 (2.9, 3.4)	3.6 (3.3, 3.9)	4.0 (3.7, 4.3)	4.3 (4.0, 4.6)
Fracture								
	Augmented	18	771	1.9 (1.1, 3.3)	2.9 (1.7, 4.9)	2.9 (1.7, 4.9)	4.0 (2.1, 7.6)	
	Non-augmented	388	8816	3.1 (2.8, 3.5)	4.0 (3.6, 4.5)	4.2 (3.8, 4.7)	4.6 (4.1, 5.1)	4.8 (4.4, 5.3)
TOTAL		**2188**	**61622**					

Note: Restricted to modern prostheses

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR106 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Augmentation (Primary Diagnosis OA)



HR - adjusted for age and gender

Osteoarthritis Non-augmented vs Osteoarthritis Augmented

0 - 3Mth: HR=2.14 (95% CI 1.42, 3.23), p<0.001

3Mth+: HR=0.91 (95% CI 0.72, 1.16), p=0.459

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis	Augmented	4765	3268	2176	1465	949	538
	Non-augmented	23154	20082	17340	14971	12436	10212

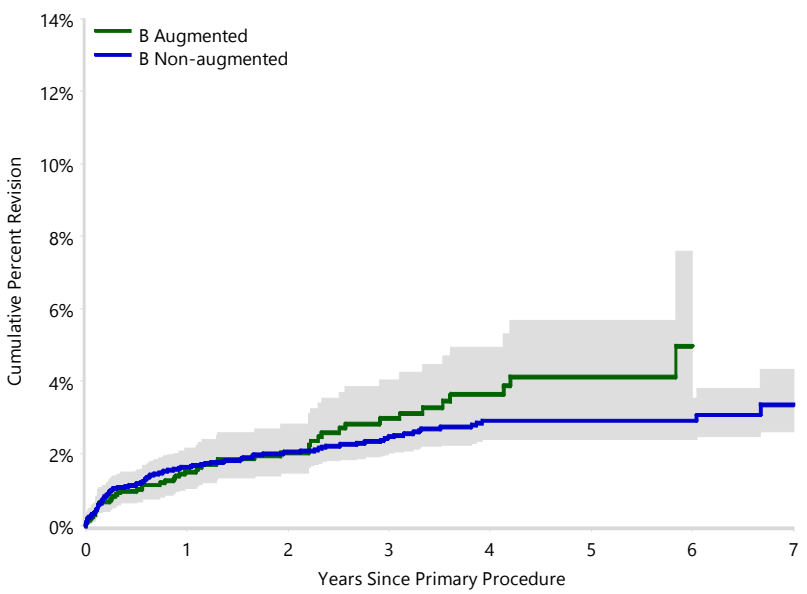
Note: Restricted to modern prostheses

Table SSR150 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis, Glenoid Morphology and Glenoid Augmentation

Primary Diagnosis	Glenoid Morphology	Glenoid Augmentation	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis									
	A	Augmented	27	1378	1.6 (1.0, 2.5)	2.1 (1.3, 3.2)	2.3 (1.5, 3.6)	3.1 (1.9, 5.0)	3.1 (1.9, 5.0)
		Non-augmented	216	7939	1.6 (1.4, 1.9)	2.6 (2.2, 3.0)	3.0 (2.6, 3.5)	3.2 (2.8, 3.7)	3.4 (3.0, 3.9)
	B	Augmented	55	2255	1.5 (1.0, 2.1)	2.0 (1.5, 2.8)	3.0 (2.2, 4.0)	3.6 (2.7, 4.9)	4.1 (3.0, 5.7)
		Non-augmented	107	4618	1.6 (1.3, 2.1)	2.0 (1.6, 2.5)	2.5 (2.0, 3.0)	2.9 (2.4, 3.5)	2.9 (2.4, 3.5)
	C	Augmented	6	496	0.7 (0.2, 2.1)	0.7 (0.2, 2.1)	0.7 (0.2, 2.1)	1.3 (0.4, 3.9)	3.6 (1.4, 9.4)
		Non-augmented	28	732	2.6 (1.6, 4.0)	3.4 (2.3, 5.1)	3.9 (2.6, 5.7)	4.4 (3.0, 6.4)	4.8 (3.3, 7.1)
Rotator Cuff Arthropathy									
	A	Augmented	41	1748	1.8 (1.3, 2.6)	2.7 (1.9, 3.8)	2.9 (2.1, 4.0)	3.5 (2.4, 5.1)	3.5 (2.4, 5.1)
		Non-augmented	350	10632	2.2 (1.9, 2.5)	3.0 (2.7, 3.4)	3.5 (3.1, 3.9)	3.8 (3.4, 4.3)	4.0 (3.6, 4.5)
	B	Augmented	29	1425	1.5 (0.9, 2.3)	2.3 (1.5, 3.4)	2.6 (1.8, 4.0)	2.6 (1.8, 4.0)	3.3 (2.0, 5.4)
		Non-augmented	87	2745	2.2 (1.7, 2.8)	2.9 (2.3, 3.6)	3.4 (2.7, 4.2)	3.6 (2.9, 4.5)	3.9 (3.1, 4.8)
	C	Augmented	8	310	2.4 (1.2, 5.0)	2.9 (1.5, 5.8)	2.9 (1.5, 5.8)	2.9 (1.5, 5.8)	
		Non-augmented	12	360	2.1 (1.0, 4.4)	2.8 (1.5, 5.4)	3.2 (1.7, 5.9)	3.2 (1.7, 5.9)	4.9 (2.6, 9.0)
Fracture									
	A	Augmented	14	532	2.0 (1.0, 3.9)	3.5 (1.9, 6.4)	3.5 (1.9, 6.4)		
		Non-augmented	186	4774	3.0 (2.5, 3.5)	3.9 (3.4, 4.6)	4.1 (3.5, 4.7)	4.4 (3.8, 5.0)	4.7 (4.0, 5.4)
	B	Augmented	3	110	3.0 (1.0, 8.9)				
		Non-augmented	14	286	3.3 (1.7, 6.2)	4.8 (2.8, 8.5)	4.8 (2.8, 8.5)	6.3 (3.7, 10.7)	6.3 (3.7, 10.7)
	C	Augmented	0	17	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
		Non-augmented	1	38	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)
TOTAL			**1184**	**40395**					

Note: Excludes 21,255 procedures with unknown glenoid augmentation or glenoid morphology
Restricted to modern prostheses.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR107 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology B and Glenoid Augmentation (Primary Diagnosis OA)



HR - adjusted for age and gender

B Augmented vs B Non-augmented

0 - 3Mth: HR=0.72 (95% CI 0.40, 1.27), p=0.252

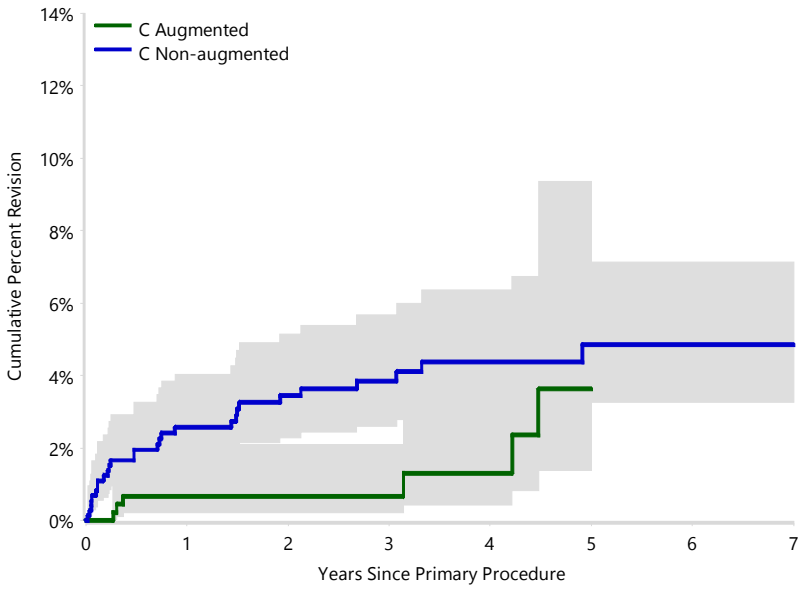
3Mth - 9Mth: HR=0.89 (95% CI 0.41, 1.94), p=0.768

9Mth+: HR=2.08 (95% CI 1.30, 3.34), p=0.002

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
B	Augmented	2255	1533	1017	688	427	221
	Non-augmented	4618	3710	2935	2292	1608	1091

Note: Restricted to modern prostheses.

Figure SSR108 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology C and Glenoid Augmentation (Primary Diagnosis OA)



HR - adjusted for age and gender

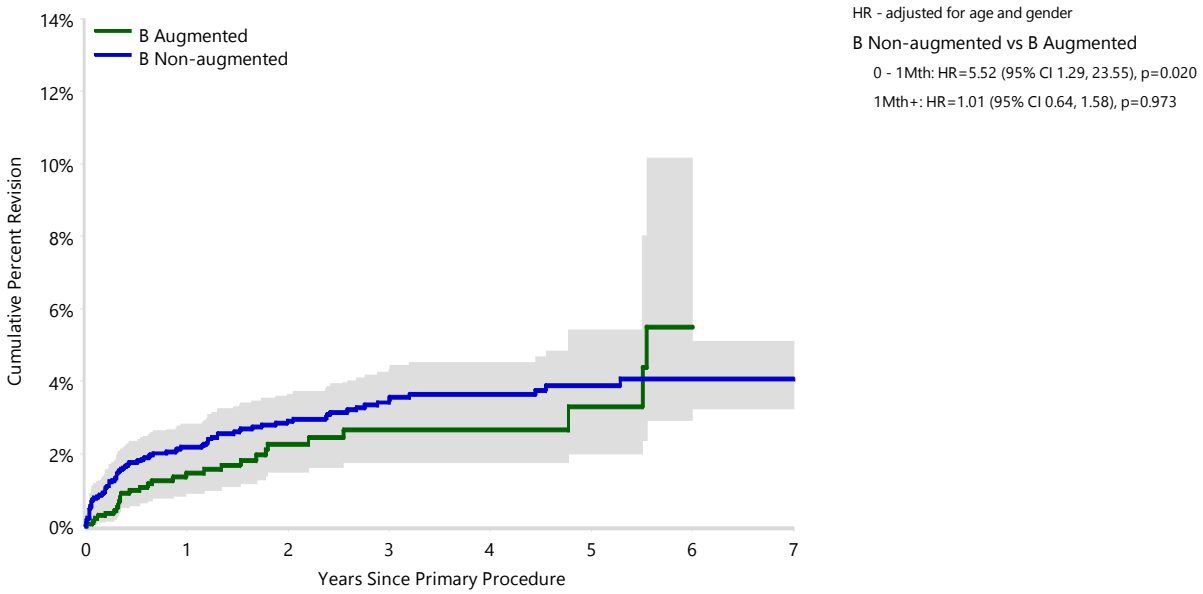
C Non-augmented vs C Augmented

Entire Period: HR=2.65 (95% CI 1.09, 6.41), p=0.031

Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
C	Augmented	496	357	243	167	112	59
	Non-augmented	732	616	507	399	283	190

Note: Restricted to modern prostheses.

Figure SSR109 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology B and Glenoid Augmentation (Primary Diagnosis Rotator Cuff Arthropathy)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
B	Augmented	1425	955	593	386	240	130
	Non-augmented	2745	2242	1756	1346	953	637

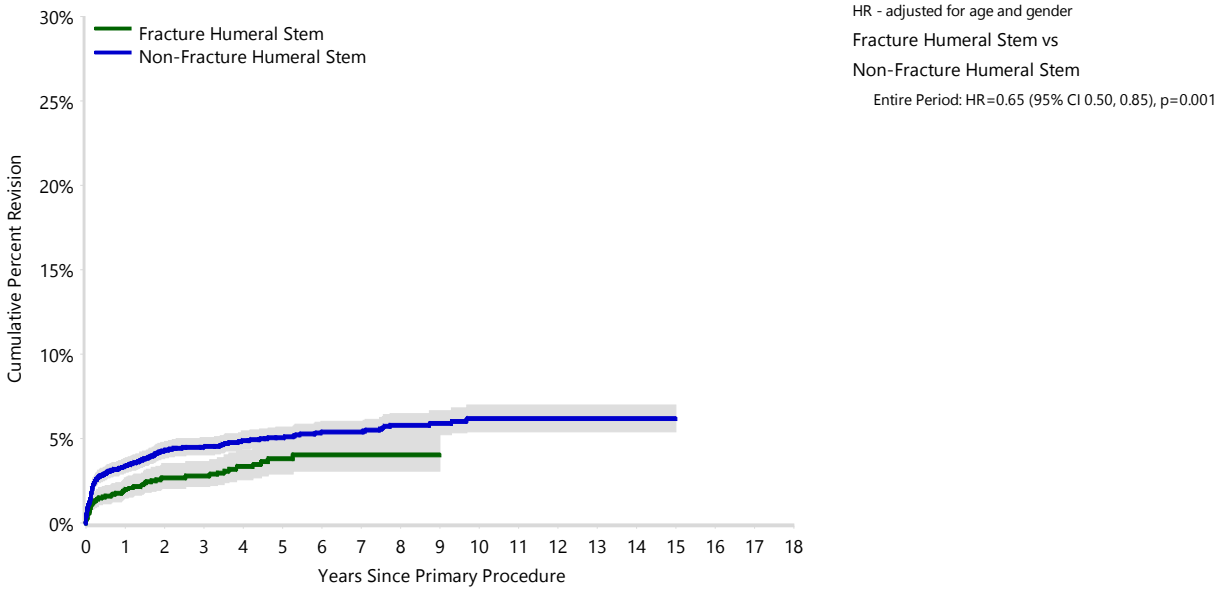
Note: Restricted to modern prostheses.

Table SSR151 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Stem Type (Primary Diagnosis Fracture)

Stem Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	65	2305	2.0 (1.5, 2.7)	2.8 (2.1, 3.6)	3.8 (2.9, 5.0)	4.0 (3.1, 5.3)		
Non-Fracture Humeral Stem	341	7284	3.4 (3.0, 3.8)	4.5 (4.0, 5.1)	5.1 (4.6, 5.7)	5.4 (4.8, 6.0)	6.2 (5.4, 7.0)	6.2 (5.4, 7.0)
TOTAL	**406**	**9589**						

Note: Restricted to modern prostheses

Figure SSR110 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Stem Type (Primary Diagnosis Fracture)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Fracture Humeral Stem	2305	1814	1042	502	175	14	0
Non-Fracture Humeral Stem	7284	6061	4246	2770	1641	575	75

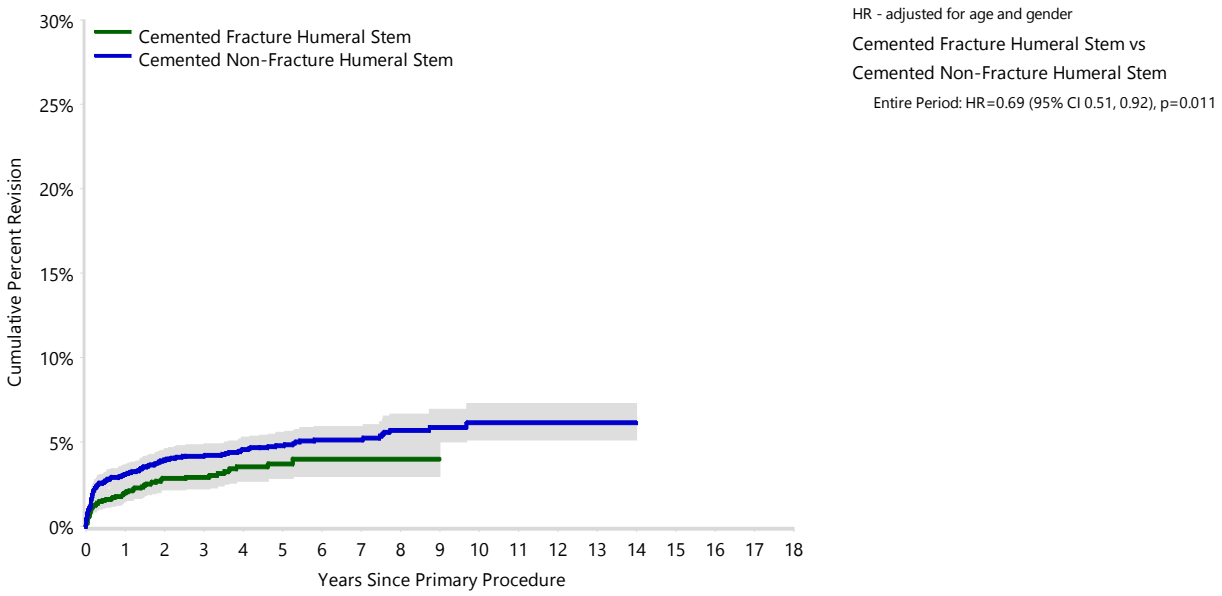
Note: Restricted to modern prostheses

Table SSR152 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Humeral Fixation and Stem Type (Primary Diagnosis Fracture)

Humeral Fixation	Stem Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cementless	Fracture Humeral Stem	6	238	1.7 (0.6, 4.5)	1.7 (0.6, 4.5)	4.4 (1.7, 10.7)			
	Non-Fracture Humeral Stem	146	2867	3.8 (3.2, 4.6)	5.1 (4.3, 6.0)	5.5 (4.7, 6.5)	5.8 (4.9, 6.9)	6.3 (5.2, 7.6)	
Cemented	Fracture Humeral Stem	59	2067	2.0 (1.5, 2.7)	2.9 (2.2, 3.8)	3.7 (2.8, 4.9)	4.0 (3.0, 5.3)		
	Non-Fracture Humeral Stem	195	4417	3.1 (2.6, 3.7)	4.2 (3.6, 4.8)	4.8 (4.2, 5.6)	5.1 (4.4, 5.9)	6.1 (5.1, 7.3)	6.1 (5.1, 7.3)
TOTAL		**406**	**9589**						

Note: Restricted to modern prostheses

Figure SSR111 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement with Cemented Humeral Fixation by Stem Type (Primary Diagnosis Fracture)



	Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Cemented	Fracture Humeral Stem	2067	1615	928	438	151	11	0
	Non-Fracture Humeral Stem	4417	3685	2582	1651	962	343	40

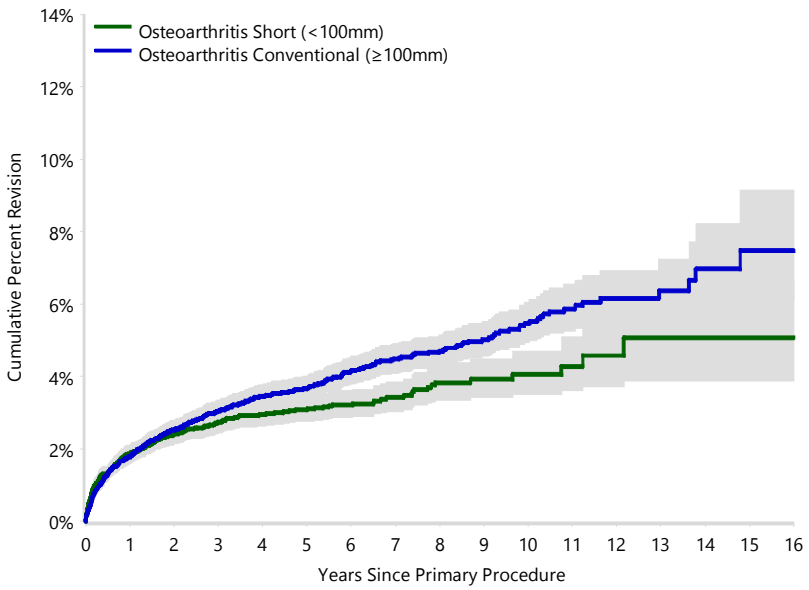
Note: Restricted to modern prostheses

Table SSR153 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Humeral Stem Length

Primary Diagnosis	Humeral Stem Length	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis									
	Short (<100mm)	338	12636	1.9 (1.6, 2.1)	2.7 (2.4, 3.1)	3.1 (2.8, 3.4)	3.4 (3.0, 3.9)	4.1 (3.5, 4.7)	5.1 (3.9, 6.6)
	Conventional (≥100mm)	555	15152	1.8 (1.6, 2.0)	3.0 (2.8, 3.3)	3.7 (3.4, 4.0)	4.5 (4.1, 4.9)	5.5 (4.9, 6.1)	7.0 (5.9, 8.2)
Rotator Cuff Arthropathy									
	Short (<100mm)	359	10896	2.3 (2.0, 2.6)	3.4 (3.1, 3.8)	4.0 (3.6, 4.5)	4.4 (3.9, 4.9)	5.0 (4.3, 5.9)	5.8 (4.6, 7.2)
	Conventional (≥100mm)	521	13091	2.3 (2.0, 2.5)	3.5 (3.2, 3.9)	4.2 (3.9, 4.6)	4.8 (4.4, 5.3)	5.6 (5.1, 6.2)	6.1 (5.4, 6.9)
Fracture									
	Short (<100mm)	128	2631	3.8 (3.1, 4.6)	5.1 (4.3, 6.1)	5.5 (4.6, 6.5)	5.6 (4.7, 6.7)	5.6 (4.7, 6.7)	
	Conventional (≥100mm)	278	6948	2.8 (2.4, 3.2)	3.8 (3.3, 4.3)	4.5 (4.0, 5.1)	4.9 (4.3, 5.5)	5.9 (5.0, 6.9)	5.9 (5.0, 6.9)
TOTAL		**2179**	**61354**						

Note: Excludes procedures with unknown humeral stem length
Restricted to modern prostheses
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05).
They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR112 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Humeral Stem Length (Primary Diagnosis OA)

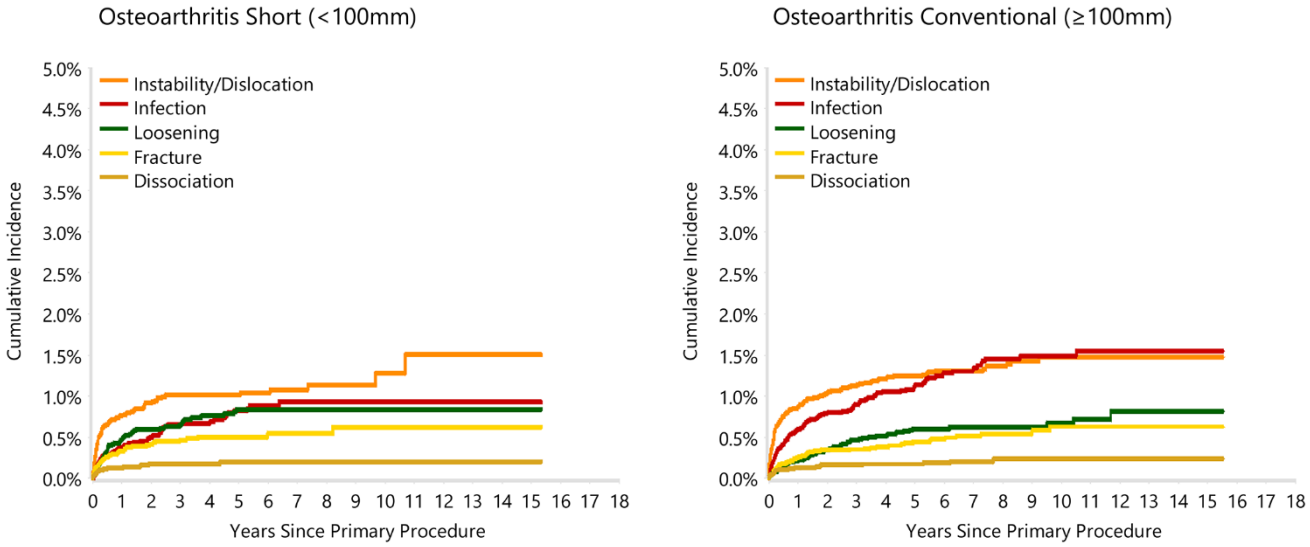


HR - adjusted for age and gender
Osteoarthritis Conventional (≥100mm) vs Osteoarthritis Short (<100mm)
0 - 3Mth: HR=0.88 (95% CI 0.69, 1.12), p=0.283
3Mth - 6Mth: HR=1.46 (95% CI 0.96, 2.23), p=0.077
6Mth - 3.5Yr: HR=1.25 (95% CI 1.02, 1.54), p=0.034
3.5Yr+: HR=2.14 (95% CI 1.43, 3.19), p<0.001

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Osteoarthritis	Short (<100mm)	12636	10022	6523	3911	1985	632	121
	Conventional (≥100mm)	15152	13281	9902	6834	4170	1603	267

Note: Excludes procedures with unknown humeral stem length
Restricted to modern prostheses

Figure SSR113 Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Humeral Stem Length



Note: Restricted to modern prostheses

Table SSR154 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Glenosphere Lateralisation

Primary Diagnosis	Glenoid Lateralisation	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis								
	Lateralised	18	1047	1.5 (0.8, 2.5)	2.0 (1.2, 3.4)	2.4 (1.4, 4.1)	3.2 (1.7, 5.9)	3.2 (1.7, 5.9)
	Standard	878	26764	1.8 (1.7, 2.0)	2.5 (2.3, 2.7)	2.9 (2.7, 3.2)	3.3 (3.0, 3.5)	3.5 (3.2, 3.7)
Rotator Cuff Arthropathy								
	Lateralised	23	876	2.6 (1.6, 4.0)	3.3 (2.2, 5.1)	3.3 (2.2, 5.1)	4.4 (2.5, 7.6)	4.4 (2.5, 7.6)
	Standard	858	23108	2.2 (2.1, 2.5)	3.1 (2.8, 3.3)	3.5 (3.3, 3.8)	3.9 (3.6, 4.1)	4.1 (3.9, 4.5)
Fracture								
	Lateralised	17	361	4.6 (2.8, 7.6)	5.2 (3.2, 8.4)	5.2 (3.2, 8.4)		
	Standard	388	9195	3.0 (2.7, 3.4)	3.9 (3.5, 4.3)	4.1 (3.7, 4.5)	4.5 (4.0, 4.9)	4.7 (4.3, 5.2)
TOTAL		**2182**	**61351**					

Note: Excludes procedures with unknown lateralisation
Restricted to modern prostheses.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

SURGEON ASSISTIVE TOOLS (SAT)

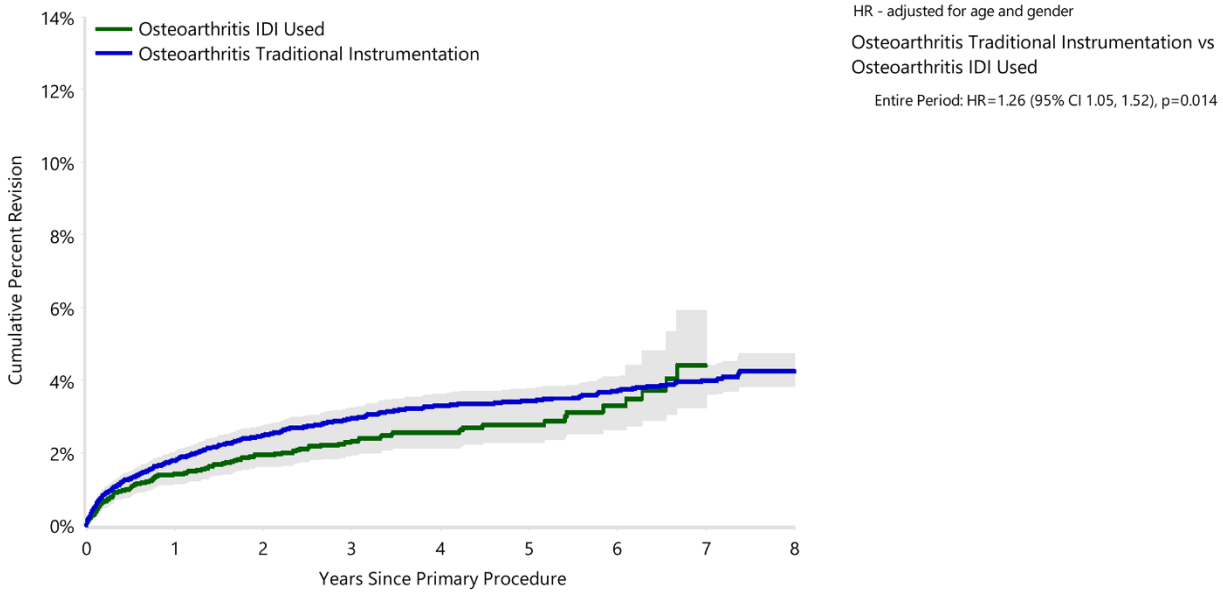
An image derived instrument (IDI) is defined as custom made pin guides or cutting blocks derived from CT or MRI images by 3D printing specifically for each patient. There are 6,977 total stemmed reverse shoulder replacements for osteoarthritis, 6,213 for rotator cuff arthropathy, and 582 for fracture utilising an IDI since their first use in 2014. In 2024, IDI are used in 42% of osteoarthritis procedures, 40.8% of rotator cuff arthropathy and 13.7% of fracture (Table SSR155 and Figure SSR114).

Table SSR155 Cumulative Percent Revision of Primary Total Stemmed Reverse Replacement Since 2016 by Primary Diagnosis and IDI Usage

Primary Diagnosis	IDI Use	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis								
	IDI Used	144	6977	1.4 (1.1, 1.7)	1.9 (1.6, 2.3)	2.3 (1.9, 2.8)	2.6 (2.1, 3.1)	2.8 (2.3, 3.3)
	Traditional Instrumentation	477	16034	1.8 (1.6, 2.0)	2.5 (2.2, 2.7)	2.9 (2.7, 3.2)	3.3 (3.0, 3.6)	3.4 (3.1, 3.8)
Rotator Cuff Arthropathy								
	IDI Used	201	6213	2.2 (1.9, 2.7)	3.0 (2.6, 3.5)	3.6 (3.1, 4.2)	4.1 (3.5, 4.7)	4.4 (3.8, 5.2)
	Traditional Instrumentation	467	14206	2.1 (1.9, 2.4)	2.9 (2.7, 3.3)	3.3 (3.0, 3.7)	3.6 (3.3, 3.9)	3.8 (3.5, 4.2)
Fracture								
	IDI Used	23	582	2.8 (1.8, 4.6)	4.5 (2.9, 6.9)	4.5 (2.9, 6.9)	4.5 (2.9, 6.9)	6.8 (3.9, 11.7)
	Traditional Instrumentation	315	7415	3.2 (2.8, 3.6)	4.1 (3.7, 4.6)	4.3 (3.8, 4.8)	4.8 (4.3, 5.3)	5.0 (4.5, 5.6)
TOTAL		**1627**	**51427**					

Note: Restricted to modern prostheses. Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Figure SSR114 Cumulative Percent Revision of Primary Total Stemmed Reverse Replacement Since 2016 by IDI Usage (Primary Diagnosis OA)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis	IDI Used	6977	5223	3781	2668	1730	1015
	Traditional Instrumentation	16034	13402	11147	9318	7362	5637

Note: Restricted to modern prostheses

OPERATIVE TECHNIQUE

Rotator Cuff Repair

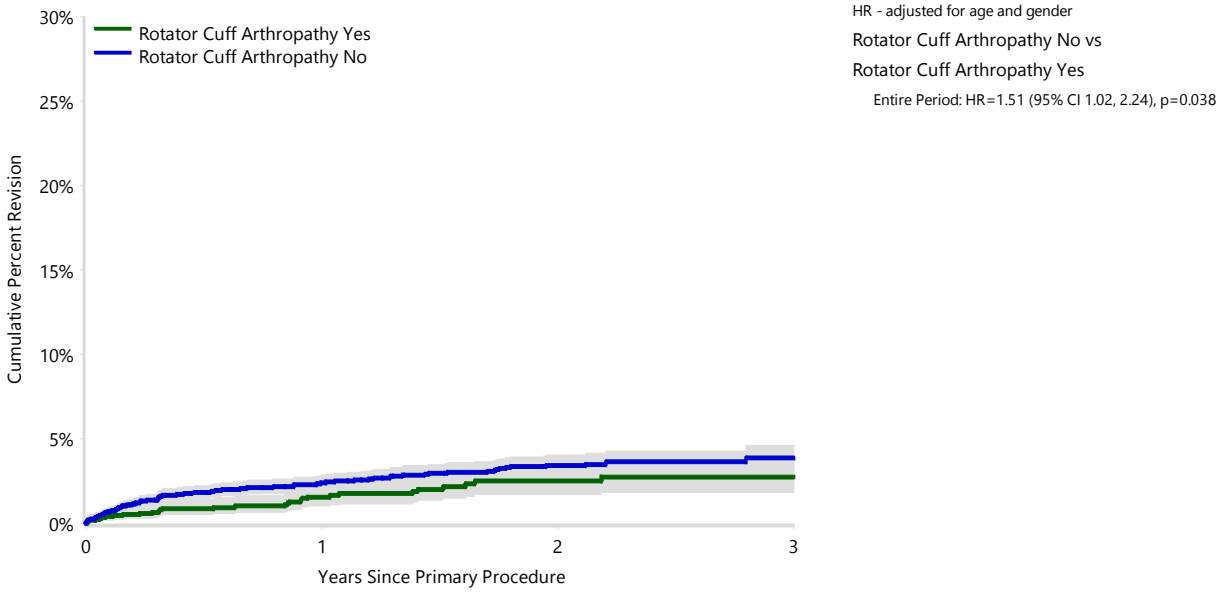
When a rotator cuff repair is not undertaken as part of the implantation of a total stemmed reverse shoulder replacement there is an increased rate of revision for rotator cuff arthropathy and fracture but no difference for osteoarthritis (Table SSR156, Figure SSR115 and Figure SSR116).

Table SSR156 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Primary Diagnosis and Rotator Cuff Repair

Primary Diagnosis	Rotator Cuff Repair	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Osteoarthritis								
	Yes	24	1940	1.1 (0.7, 1.8)	1.9 (1.3, 3.0)	1.9 (1.3, 3.0)		
	No	99	5262	1.6 (1.3, 2.0)	2.3 (1.9, 2.9)	2.8 (2.2, 3.5)	3.8 (2.6, 5.5)	
Rotator Cuff Arthropathy								
	Yes	30	1747	1.6 (1.0, 2.4)	2.5 (1.7, 3.6)	2.8 (1.9, 4.1)		
	No	156	5667	2.4 (2.0, 2.8)	3.4 (2.9, 4.1)	3.9 (3.2, 4.6)		
Fracture								
	Yes	20	896	2.2 (1.4, 3.5)	2.7 (1.7, 4.3)	2.7 (1.7, 4.3)		
	No	49	1200	3.9 (2.9, 5.2)	5.1 (3.9, 6.9)	5.1 (3.9, 6.9)		
TOTAL		**378**	**16712**					

Note: Restricted to modern prostheses. Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report. .

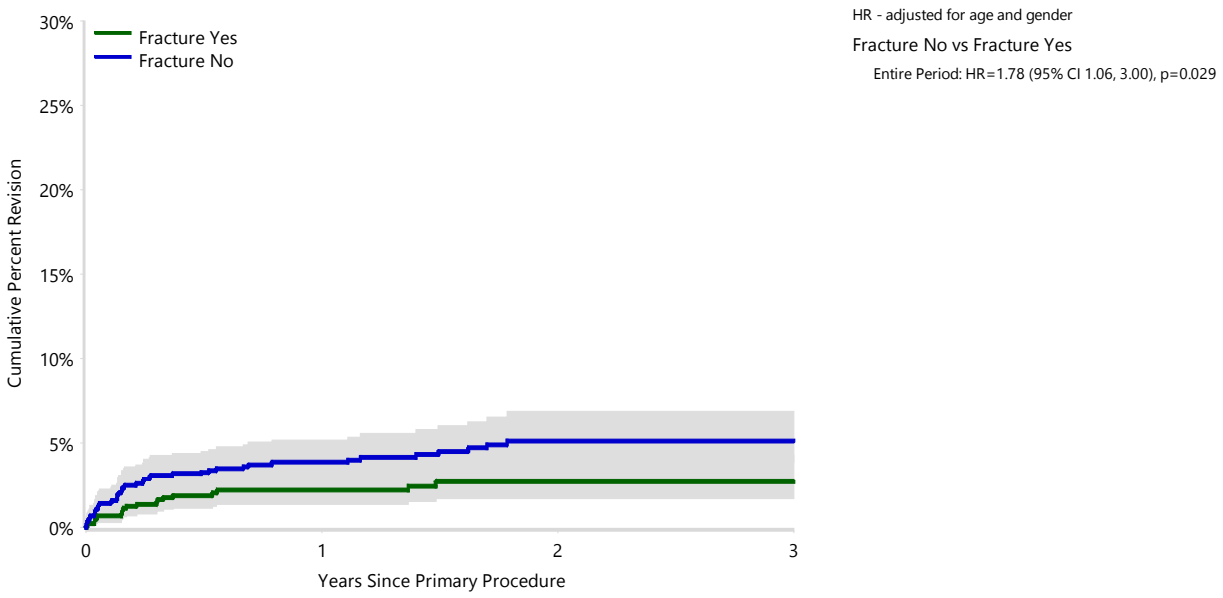
Figure SSR115 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Rotator Cuff Repair (Primary Diagnosis Rotator Cuff Arthropathy)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Rotator Cuff Arthropathy	Yes	1747	1014	437	118	8	0
	No	5667	3517	1795	655	38	0

Note: Restricted to modern prostheses

Figure SSR116 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Rotator Cuff Repair (Primary Diagnosis Fracture)



Number at Risk		0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Fracture	Yes	896	511	242	73	3	0
	No	1200	705	361	131	14	0

Note: Restricted to modern prostheses

PROSTHESIS COMBINATIONS BY PRIMARY DIAGNOSIS

The outcomes of the most commonly used prosthesis combinations are listed in Table SSR157 to Table SSR159. The most commonly used cementless prosthesis combinations are listed in Table SSR160 to Table SSR162. The most commonly used hybrid (humerus cemented) prosthesis combinations are listed in Table SSR163 to Table SSR165.

Table SSR157 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	79	1606	2.0 (1.4, 2.8)	3.3 (2.6, 4.4)	3.9 (3.0, 5.0)	5.3 (4.2, 6.7)	6.1 (4.8, 7.7)	7.1 (5.5, 9.3)
	Perform Reversed	4	133	0.8 (0.1, 5.5)	3.4 (1.0, 10.7)				
Affinis	Affinis	28	826	1.4 (0.8, 2.4)	3.1 (2.1, 4.7)	3.3 (2.2, 4.9)	4.0 (2.7, 6.0)		
AltiVate Reverse	RSP	22	1166	1.4 (0.8, 2.4)	2.8 (1.8, 4.3)				
Ascend Flex	Aequalis	69	1983	2.2 (1.6, 2.9)	3.7 (2.9, 4.7)	4.3 (3.3, 5.5)	5.1 (3.8, 7.0)		
	Perform Reversed	21	1018	2.4 (1.6, 3.7)	2.6 (1.7, 4.0)				
Comprehensive	Comprehensive Reverse	48	3788	0.9 (0.6, 1.2)	1.3 (1.0, 1.8)	1.7 (1.3, 2.4)	1.7 (1.3, 2.4)	3.0 (1.3, 7.0)	
Delta Xtend	Delta Xtend	199	5465	1.8 (1.5, 2.2)	2.8 (2.4, 3.3)	3.2 (2.8, 3.8)	3.8 (3.2, 4.4)	4.7 (4.0, 5.5)	6.1 (4.9, 7.7)
Equinoxe	Equinoxe	123	3506	1.9 (1.5, 2.5)	3.1 (2.6, 3.9)	4.1 (3.4, 5.0)	6.4 (5.1, 8.1)		
Global Unite	Delta Xtend	16	621	1.1 (0.5, 2.4)	3.0 (1.8, 5.1)	3.6 (2.1, 6.0)	4.2 (2.4, 7.2)		
MSS	MSS	1	275	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)				
RSP	RSP	34	787	2.4 (1.6, 3.8)	3.8 (2.6, 5.4)	4.6 (3.3, 6.4)	4.6 (3.3, 6.4)		
SMR	SMR	1	173	0.6 (0.1, 4.3)					
	SMR Axioma	5	117	1.7 (0.4, 6.8)	4.8 (2.0, 11.1)				
	SMR L1	188	5177	2.4 (2.0, 2.8)	3.3 (2.8, 3.8)	3.5 (3.0, 4.1)	3.9 (3.4, 4.5)	4.6 (3.9, 5.4)	5.6 (4.3, 7.3)
Trabecular Metal	Comprehensive Reverse	3	212	1.0 (0.3, 4.0)	2.0 (0.6, 6.6)	2.0 (0.6, 6.6)			
	Trabecular Metal	38	823	1.6 (0.9, 2.8)	3.6 (2.5, 5.2)	4.7 (3.4, 6.6)	5.0 (3.6, 6.9)	5.9 (4.1, 8.3)	
Other (27)		19	258	6.5 (4.0, 10.4)	6.5 (4.0, 10.4)	9.5 (5.8, 15.2)			
TOTAL		**898**	**27934**						

Note: Restricted to modern prostheses
Only prostheses with >100 procedures have been listed

Table SSR158 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis Rotator Cuff Arthropathy)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	70	1327	2.2 (1.5, 3.2)	3.8 (2.9, 5.0)	4.9 (3.8, 6.3)	5.4 (4.2, 6.9)	7.2 (5.6, 9.3)	7.2 (5.6, 9.3)
	Perform Reversed	0	117	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)				
Affinis	Affinis	27	748	1.6 (0.9, 2.8)	3.0 (1.9, 4.5)	3.9 (2.6, 5.7)	4.9 (2.9, 8.0)		
AltiVate	RSP	2	77	3.0 (0.8, 11.7)	3.0 (0.8, 11.7)				
AltiVate Reverse	RSP	48	1329	2.7 (1.9, 3.8)	4.6 (3.4, 6.2)				
Ascend Flex	Aequalis	78	1845	2.7 (2.0, 3.6)	4.5 (3.6, 5.7)	5.7 (4.5, 7.2)	5.7 (4.5, 7.2)		
	Perform Reversed	21	1095	1.8 (1.1, 3.0)	3.0 (1.8, 4.8)				
Comprehensive	Comprehensive Reverse	66	3226	1.3 (1.0, 1.8)	2.3 (1.8, 3.0)	3.0 (2.2, 3.9)	3.1 (2.4, 4.2)		
	Trabecular Metal	1	40	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	3.0 (0.4, 19.6)			
Delta Xtend	Delta Xtend	182	4811	2.0 (1.6, 2.4)	3.1 (2.6, 3.6)	3.7 (3.1, 4.3)	4.3 (3.7, 5.0)	4.7 (4.0, 5.4)	5.4 (4.5, 6.6)
Equinoxe	Equinoxe	93	2703	2.2 (1.7, 2.8)	3.3 (2.6, 4.1)	4.1 (3.3, 5.2)	5.2 (4.0, 6.7)		
Global Unite	Delta Xtend	14	492	1.5 (0.7, 3.1)	2.8 (1.6, 4.9)	3.6 (2.1, 6.1)	3.6 (2.1, 6.1)		
MSS	MSS	6	218	3.3 (1.2, 8.8)					
RSP	RSP	31	762	2.9 (1.9, 4.4)	3.9 (2.7, 5.6)	4.3 (3.1, 6.1)	4.3 (3.1, 6.1)		
SMR	SMR	3	107	1.9 (0.5, 7.4)					
	SMR Axioma	5	56	5.4 (1.8, 15.7)	9.4 (4.0, 21.1)	9.4 (4.0, 21.1)			
	SMR L1	173	4197	2.8 (2.3, 3.3)	3.8 (3.2, 4.4)	4.2 (3.6, 4.9)	4.6 (3.9, 5.4)	5.3 (4.4, 6.4)	6.1 (4.8, 7.7)
Trabecular Metal	Comprehensive Reverse	15	173	7.5 (4.3, 12.8)	10.4 (6.3, 17.0)	10.4 (6.3, 17.0)			
	Trabecular Metal	47	736	3.7 (2.6, 5.4)	5.3 (3.9, 7.3)	5.9 (4.3, 7.9)	6.5 (4.8, 8.6)	7.8 (5.7, 10.5)	
Other (19)		3	63	3.6 (0.9, 13.5)	5.5 (1.8, 16.2)	5.5 (1.8, 16.2)			
TOTAL		**885**	**24122**						

Note Restricted to modern prostheses

Only prostheses with >25 procedures have been listed

Table SSR159 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis Fracture)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	52	1428	2.0 (1.4, 2.9)	2.8 (2.0, 3.8)	3.8 (2.8, 5.1)	4.3 (3.2, 5.8)	5.6 (4.1, 7.7)	
	Perform Reversed	4	163	2.6 (0.8, 8.3)					
Aequalis Flex Revive	Perform Reversed	3	72	3.2 (0.8, 12.2)	6.4 (2.0, 20.0)				
Affinis	Affinis	17	373	2.2 (1.1, 4.3)	3.7 (2.1, 6.2)	5.2 (3.2, 8.3)	5.2 (3.2, 8.3)		
AltiVate Reverse	RSP	9	338	2.6 (1.3, 5.2)	3.2 (1.6, 6.0)				
Ascend Flex	Aequalis	3	82	2.5 (0.6, 9.6)	4.1 (1.3, 12.2)	4.1 (1.3, 12.2)	4.1 (1.3, 12.2)		
	Perform Reversed	3	81	4.9 (1.6, 14.7)					
Comprehensive	Comprehensive Reverse	29	1293	1.9 (1.3, 2.9)	2.3 (1.6, 3.4)	3.1 (2.1, 4.6)	3.1 (2.1, 4.6)		
Delta Xtend	Delta Xtend	87	1532	4.2 (3.3, 5.3)	5.1 (4.1, 6.4)	5.6 (4.5, 6.9)	5.8 (4.7, 7.2)	6.9 (5.4, 8.7)	
Equinoxe	Equinoxe	39	830	3.2 (2.1, 4.6)	5.0 (3.6, 7.0)	6.6 (4.6, 9.4)	6.6 (4.6, 9.4)		
Global Unite	Delta Xtend	20	634	2.3 (1.4, 3.9)	3.0 (1.9, 4.8)	4.1 (2.5, 6.9)	5.0 (2.9, 8.6)		
RSP	RSP	14	220	3.2 (1.6, 6.7)	5.8 (3.3, 10.0)	7.4 (4.4, 12.3)			
SMR	SMR L1	111	1995	4.3 (3.5, 5.3)	5.7 (4.7, 6.9)	5.9 (4.9, 7.0)	6.1 (5.1, 7.4)	6.1 (5.1, 7.4)	
Trabecular Metal	Comprehensive Reverse	3	139	2.2 (0.7, 6.6)	2.2 (0.7, 6.6)				
	Trabecular Metal	9	304	2.0 (0.9, 4.4)	2.8 (1.4, 5.5)	2.8 (1.4, 5.5)	3.4 (1.8, 6.6)	3.4 (1.8, 6.6)	
Other (12)		3	105	3.0 (1.0, 9.0)					
TOTAL		**406**	**9589**						

Note Restricted to modern prostheses

Only prostheses with >50 procedures have been listed

Table SSR160 Cumulative Percent Revision of Cementless Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	65	1215	1.9 (1.3, 2.9)	3.7 (2.7, 4.9)	4.2 (3.1, 5.5)	5.7 (4.4, 7.4)	6.5 (5.0, 8.4)	7.9 (5.9, 10.7)
	Perform Reversed	2	114	0.9 (0.1, 6.4)	0.9 (0.1, 6.4)				
Affinis	Affinis	19	517	1.2 (0.5, 2.6)	3.4 (2.1, 5.5)	3.7 (2.3, 5.9)	4.3 (2.6, 7.1)		
AltiVate Reverse	RSP	19	1069	1.4 (0.8, 2.5)	2.6 (1.6, 4.2)				
Ascend Flex	Aequalis	64	1767	2.2 (1.6, 3.0)	3.8 (2.9, 5.0)	4.5 (3.5, 5.8)	5.4 (3.9, 7.5)		
	Perform Reversed	20	902	2.5 (1.6, 4.0)	2.8 (1.8, 4.3)				
Comprehensive	Comprehensive Reverse	46	3643	0.9 (0.6, 1.3)	1.4 (1.0, 1.9)	1.7 (1.3, 2.3)	1.7 (1.3, 2.3)	1.7 (1.3, 2.3)	
Delta Xtend	Delta Xtend	157	4213	1.9 (1.5, 2.3)	2.9 (2.4, 3.5)	3.4 (2.9, 4.1)	3.9 (3.3, 4.6)	5.1 (4.3, 6.1)	7.2 (5.3, 9.8)
Equinoxe	Equinoxe	115	3335	1.9 (1.5, 2.5)	3.1 (2.5, 3.8)	4.1 (3.3, 5.0)	6.1 (4.8, 7.8)		
Global Unite	Delta Xtend	12	549	0.8 (0.3, 2.2)	2.5 (1.3, 4.7)	3.1 (1.7, 5.8)	3.8 (2.0, 7.1)		
MSS	MSS	1	273	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)				
RSP	RSP	29	680	2.5 (1.6, 4.0)	3.6 (2.4, 5.4)	4.6 (3.2, 6.5)	4.6 (3.2, 6.5)		
SMR	SMR	1	171	0.6 (0.1, 4.3)					
	SMR Axioma	4	115	1.8 (0.4, 6.9)	3.9 (1.5, 10.1)				
	SMR L1	180	5055	2.3 (1.9, 2.8)	3.2 (2.8, 3.8)	3.4 (3.0, 4.0)	3.8 (3.3, 4.5)	4.5 (3.8, 5.4)	5.6 (4.3, 7.3)
Trabecular Metal	Comprehensive Reverse	2	196	0.5 (0.1, 3.7)	1.6 (0.4, 6.7)	1.6 (0.4, 6.7)			
	Trabecular Metal	33	751	1.6 (0.9, 2.8)	3.5 (2.3, 5.1)	4.6 (3.2, 6.5)	4.8 (3.4, 6.8)	5.8 (4.0, 8.4)	
Other (23)		16	238	5.7 (3.4, 9.7)	5.7 (3.4, 9.7)	8.9 (5.2, 14.9)			
TOTAL		**785**	**24803**						

Note Restricted to modern prostheses
Only prostheses with >25 procedures have been listed

Table SSR161 Cumulative Percent Revision of Cementless Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis Rotator Cuff Arthropathy)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	59	1122	2.1 (1.4, 3.1)	3.7 (2.7, 5.0)	5.0 (3.8, 6.5)	5.5 (4.2, 7.2)	7.4 (5.6, 9.7)	
	Perform Reversed	0	95	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)			
Affinis	Affinis	18	446	1.6 (0.8, 3.3)	3.1 (1.8, 5.3)	4.4 (2.7, 7.0)	5.7 (3.2, 10.2)		
AltiVate	RSP	2	77	3.0 (0.8, 11.7)	3.0 (0.8, 11.7)				
AltiVate Reverse	RSP	44	1250	2.5 (1.8, 3.7)	4.6 (3.4, 6.2)				
Ascend Flex	Aequalis	71	1614	2.8 (2.1, 3.8)	4.7 (3.7, 6.0)	5.8 (4.6, 7.4)	5.8 (4.6, 7.4)		
	Perform Reversed	20	987	2.0 (1.3, 3.3)	3.1 (1.9, 5.1)				
Comprehensive	Comprehensive Reverse	62	3140	1.3 (0.9, 1.8)	2.2 (1.7, 2.9)	2.9 (2.1, 3.8)	3.1 (2.3, 4.1)		
	Trabecular Metal	1	40	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	3.0 (0.4, 19.6)			
Delta Xtend	Delta Xtend	162	4125	2.0 (1.6, 2.5)	3.2 (2.7, 3.8)	3.8 (3.2, 4.5)	4.5 (3.8, 5.3)	4.9 (4.1, 5.7)	5.8 (4.7, 7.2)
Equinoxe	Equinoxe	88	2607	2.2 (1.6, 2.8)	3.2 (2.5, 4.0)	4.0 (3.2, 5.1)	5.2 (4.0, 6.7)		
Global Unite	Delta Xtend	13	446	1.6 (0.8, 3.4)	2.8 (1.6, 5.1)	3.7 (2.1, 6.4)	3.7 (2.1, 6.4)		
MSS	MSS	6	212	3.4 (1.2, 9.0)					
RSP	RSP	28	700	2.7 (1.8, 4.3)	3.8 (2.6, 5.6)	4.3 (3.0, 6.2)	4.3 (3.0, 6.2)		
SMR	SMR	3	106	1.9 (0.5, 7.5)					
	SMR Axioma	4	55	3.6 (0.9, 13.8)	7.7 (3.0, 19.4)	7.7 (3.0, 19.4)			
	SMR L1	163	4087	2.6 (2.2, 3.2)	3.6 (3.1, 4.3)	4.0 (3.4, 4.7)	4.5 (3.8, 5.3)	5.2 (4.3, 6.4)	6.0 (4.7, 7.7)
Trabecular Metal	Comprehensive Reverse	12	154	6.3 (3.3, 11.8)	9.4 (5.4, 16.2)	9.4 (5.4, 16.2)			
	Trabecular Metal	45	688	3.8 (2.6, 5.6)	5.6 (4.1, 7.6)	6.1 (4.5, 8.3)	6.8 (5.1, 9.1)	7.7 (5.6, 10.4)	
Other (16)		2	56	2.0 (0.3, 13.4)	4.2 (1.1, 15.9)	4.2 (1.1, 15.9)			
TOTAL		**803**	**22007**						

Note Restricted to modern prostheses

Only prostheses with >25 procedures have been listed

Table SSR162 Cumulative Percent Revision of Cementless Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis Fracture)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	6	66	3.0 (0.8, 11.6)	3.0 (0.8, 11.6)	9.0 (3.8, 20.5)	9.0 (3.8, 20.5)	12.5 (5.6, 26.9)	
Aequalis Flex Revive	Perform Reversed	1	59	2.0 (0.3, 13.1)	2.0 (0.3, 13.1)				
Comprehensive	Comprehensive Reverse	7	298	2.3 (1.0, 5.0)	3.0 (1.4, 6.3)	3.0 (1.4, 6.3)			
Delta Xtend	Delta Xtend	9	230	2.2 (0.9, 5.2)	3.7 (1.8, 7.2)	3.7 (1.8, 7.2)	4.4 (2.3, 8.4)		
Equinoxe	Equinoxe	9	141	4.4 (2.0, 9.4)	5.6 (2.6, 11.5)				
Global Unite	Delta Xtend	4	140	1.4 (0.4, 5.7)	1.4 (0.4, 5.7)	5.3 (1.8, 14.9)			
SMR	SMR L1	95	1696	4.3 (3.4, 5.4)	5.7 (4.7, 6.9)	5.9 (4.8, 7.2)	6.2 (5.0, 7.5)	6.2 (5.0, 7.5)	
Trabecular Metal	Trabecular Metal	2	59	3.4 (0.9, 12.9)	3.4 (0.9, 12.9)	3.4 (0.9, 12.9)	3.4 (0.9, 12.9)	3.4 (0.9, 12.9)	
Other (15)		7	232	2.8 (1.3, 6.1)	3.5 (1.7, 7.2)	3.5 (1.7, 7.2)			
TOTAL		**140**	**2921**						

Note Restricted to modern prostheses

Only prostheses with >50 procedures have been listed

Table SSR163 Cumulative Percent Revision of Hybrid (Humerus Cemented) Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis OA)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	14	367	2.2 (1.1, 4.4)	2.5 (1.3, 4.8)	3.3 (1.8, 5.9)	4.3 (2.5, 7.5)	5.1 (2.9, 8.9)	
Affinis	Affinis	8	288	1.7 (0.7, 4.1)	2.5 (1.2, 5.3)	2.5 (1.2, 5.3)	3.3 (1.6, 6.8)		
Ascend Flex	Aequalis	5	193	2.1 (0.8, 5.6)	2.8 (1.2, 6.5)				
	Perform Reversed	1	110	1.5 (0.2, 10.1)					
Comprehensive	Comprehensive Reverse	1	135	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)				
Delta Xtend	Delta Xtend	41	1189	1.6 (1.0, 2.5)	2.5 (1.7, 3.6)	2.8 (2.0, 3.9)	3.4 (2.5, 4.7)	3.8 (2.7, 5.2)	4.5 (3.2, 6.3)
Equinoxe	Equinoxe	7	158	1.9 (0.6, 5.9)	3.8 (1.6, 9.2)				
RSP	RSP	5	101	2.0 (0.5, 7.7)	5.2 (2.2, 12.1)	5.2 (2.2, 12.1)			
Other (20)		22	362	3.2 (1.8, 5.7)	6.9 (4.6, 10.5)	7.7 (5.0, 11.7)	7.7 (5.0, 11.7)		
TOTAL		**104**	**2903**						

Note Restricted to modern prostheses

Only prostheses with >25 procedures have been listed

Table SSR164 Cumulative Percent Revision of Hybrid (Humerus Cemented) Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis Rotator Cuff Arthropathy)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	11	201	3.0 (1.4, 6.6)	4.6 (2.4, 8.6)	4.6 (2.4, 8.6)	5.3 (2.9, 9.7)	6.7 (3.6, 12.4)	
Affinis	Affinis	9	279	1.8 (0.8, 4.3)	3.0 (1.5, 5.9)	3.4 (1.8, 6.5)			
AltiVate Reverse	RSP	2	70	3.1 (0.8, 11.7)	3.1 (0.8, 11.7)				
Ascend Flex	Aequalis	4	223	0.9 (0.2, 3.6)	2.2 (0.8, 5.9)				
	Perform Reversed	1	103	0.0 (0.0, 0.0)					
Comprehensive	Comprehensive Reverse	4	81	3.7 (1.2, 11.1)	6.0 (2.2, 15.8)				
Delta Xtend	Delta Xtend	19	667	1.8 (1.0, 3.2)	2.6 (1.6, 4.2)	2.8 (1.8, 4.5)	3.1 (2.0, 4.9)	3.1 (2.0, 4.9)	
Equinoxe	Equinoxe	4	84	3.9 (1.3, 11.7)	5.6 (2.1, 14.4)	5.6 (2.1, 14.4)			
Global Unite	Delta Xtend	1	43	0.0 (0.0, 0.0)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)		
RSP	RSP	3	59	5.1 (1.7, 15.0)	5.1 (1.7, 15.0)	5.1 (1.7, 15.0)	5.1 (1.7, 15.0)		
SMR	SMR L1	4	44	6.8 (2.3, 19.7)	9.2 (3.6, 22.7)	9.2 (3.6, 22.7)	9.2 (3.6, 22.7)	9.2 (3.6, 22.7)	
Trabecular Metal	Trabecular Metal	2	43	2.3 (0.3, 15.4)	2.3 (0.3, 15.4)	2.3 (0.3, 15.4)	2.3 (0.3, 15.4)	11.2 (2.3, 45.1)	
Other (10)		5	54	9.9 (4.3, 22.3)	9.9 (4.3, 22.3)	9.9 (4.3, 22.3)			
TOTAL		**69**	**1951**						

Note Restricted to modern prostheses

Only prostheses with >25 procedures have been listed

Table SSR165 Cumulative Percent Revision of Hybrid (Humerus Cemented) Primary Total Stemmed Reverse Shoulder Replacement by Prosthesis Combination (Primary Diagnosis Fracture)

Humeral Stem	Glenoid Component	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Aequalis	Aequalis	45	1339	2.0 (1.4, 2.9)	2.8 (2.0, 3.9)	3.3 (2.4, 4.5)	3.9 (2.8, 5.3)	5.0 (3.5, 7.1)	
	Perform Reversed	4	159	2.7 (0.9, 8.5)					
Affinis	Affinis	16	349	2.0 (1.0, 4.2)	3.6 (2.1, 6.3)	5.3 (3.2, 8.5)	5.3 (3.2, 8.5)		
AltiVate Reverse	RSP	8	278	2.8 (1.4, 5.9)	3.5 (1.7, 6.9)				
Comprehensive	Comprehensive Reverse	19	934	1.7 (1.0, 2.9)	2.1 (1.3, 3.4)	2.8 (1.7, 4.5)	2.8 (1.7, 4.5)		
Delta Xtend	Delta Xtend	75	1279	4.4 (3.4, 5.6)	5.2 (4.1, 6.6)	5.8 (4.6, 7.3)	5.9 (4.7, 7.4)	7.2 (5.6, 9.3)	
Equinoxe	Equinoxe	26	661	2.6 (1.6, 4.2)	4.7 (3.2, 7.0)	5.4 (3.5, 8.1)			
Global Unite	Delta Xtend	15	454	2.6 (1.5, 4.7)	3.6 (2.1, 6.0)	3.6 (2.1, 6.0)			
RSP	RSP	14	176	4.1 (2.0, 8.3)	7.3 (4.2, 12.5)	9.2 (5.5, 15.2)			
SMR	SMR L1	10	265	3.1 (1.6, 6.1)	4.1 (2.2, 7.6)	4.1 (2.2, 7.6)	4.1 (2.2, 7.6)		
Trabecular Metal	Comprehensive Reverse	3	117	2.6 (0.8, 7.9)	2.6 (0.8, 7.9)				
	Trabecular Metal	7	228	1.8 (0.7, 4.7)	2.8 (1.3, 6.2)	2.8 (1.3, 6.2)	3.8 (1.8, 8.2)		
Other (12)		6	125	4.2 (1.8, 9.7)					
TOTAL		**248**	**6364**						

Note Restricted to modern prostheses

Only prostheses with >50 procedures have been listed

Special Clinical Assessment – Shoulder Implant Choice

The purpose of the following analyses is to inform surgeons about the outcome of specific clinical options across several shoulder prosthesis categories. There are two new special clinical analyses that evaluate prosthesis class choices for the surgical management of primary diagnoses in shoulder replacement.

The first analysis examines patients aged <60 years with osteoarthritis, comparing outcomes for hemi stemmed anatomic with a pyrocarbon humeral head, total stemmed anatomic with a polyethylene glenoid, total stemless anatomic with a polyethylene glenoid and a primary stemmed reverse replacement. A polyethylene glenoid is all polyethylene glenoids excluding modular metal backed glenoids in total shoulder anatomic procedures (Table SSR166 and Figure SSR117).

The second assessment compares total stemmed reverse replacements for all primary diagnoses, stratified by glenoid component type – custom, augmented or standard (Table SSR167 and Figure SSR118).

It is important to recognise that there are patient and prosthesis factors that may further confound the results beyond that which are presented here.

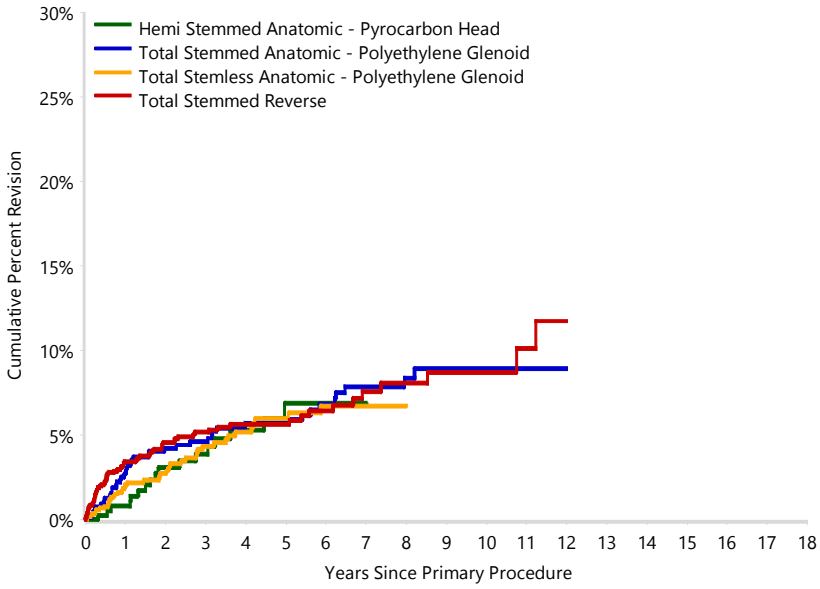
Peer reviewed journal articles that are based on AOANJRR shoulder replacement data, from the first publication to the present, are available on the AOANJRR website: https://aoanjrr.sahmri.com/publications-2025

Table SSR166 Cumulative Percent Revision of Primary Shoulder Replacement in Patients Aged <60 Years by Class (Primary Diagnosis OA)

Shoulder Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Hemi Stemmed Anatomic - Pyrocarbon Head	17	432	0.8 (0.3, 2.4)	3.9 (2.2, 6.8)	6.9 (4.2, 11.2)	6.9 (4.2, 11.2)		
Total Stemmed Anatomic - Polyethylene Glenoid	46	658	2.9 (1.8, 4.5)	4.6 (3.2, 6.6)	5.9 (4.2, 8.2)	7.9 (5.7, 10.7)	8.9 (6.5, 12.2)	
Total Stemless Anatomic - Polyethylene Glenoid	44	1072	2.1 (1.3, 3.2)	4.4 (3.1, 6.1)	6.0 (4.4, 8.1)	6.7 (4.9, 9.2)		
Total Stemmed Reverse	68	1241	3.4 (2.5, 4.7)	5.2 (4.0, 6.7)	5.6 (4.4, 7.3)	7.6 (5.7, 10.0)	8.7 (6.4, 11.8)	
TOTAL	**175**	**3403**						

Note: Restricted to modern prostheses

Figure SSR117 Cumulative Percent Revision of Primary Shoulder Replacement in Patients Aged <60 Years by Class (Primary Diagnosis OA)



HR - adjusted for age and gender

Total Stemmed Anatomic - Polyethylene Glenoid vs Hemi Stemmed Anatomic - Pyrocarbon Head

Entire Period: HR=1.28 (95% CI 0.71, 2.29), p=0.407

Total Stemless Anatomic - Polyethylene Glenoid vs Hemi Stemmed Anatomic - Pyrocarbon Head

Entire Period: HR=1.08 (95% CI 0.61, 1.92), p=0.791

Total Stemmed Reverse vs Hemi Stemmed Anatomic - Pyrocarbon Head

0 - 6Mth: HR=3.32 (95% CI 1.56, 7.07), p=0.001

6Mth+: HR=0.93 (95% CI 0.51, 1.70), p=0.811

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Hemi Stemmed Anatomic - Pyrocarbon Head	432	335	221	107	49	10	0
Total Stemmed Anatomic - Polyethylene Glenoid	658	587	471	348	227	80	26
Total Stemless Anatomic - Polyethylene Glenoid	1072	859	523	284	123	17	0
Total Stemmed Reverse	1241	990	668	399	212	88	23

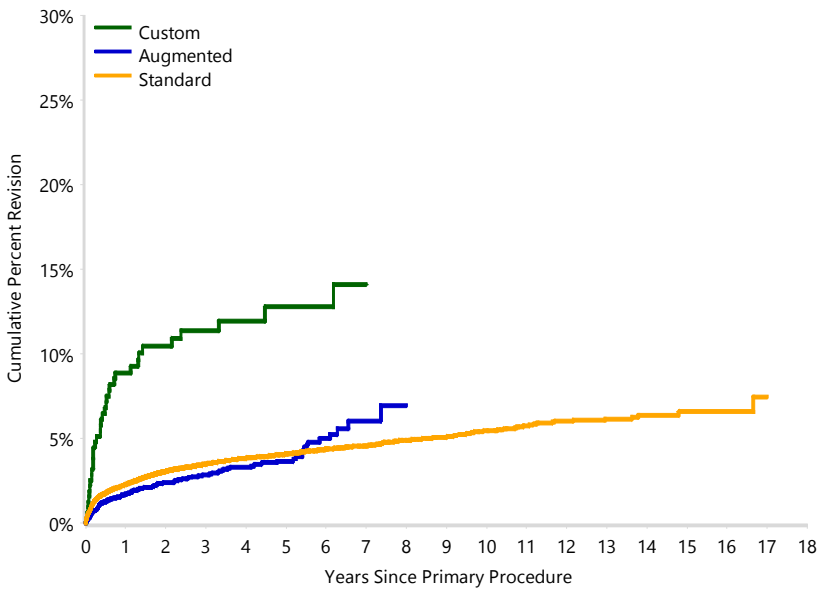
Note: Restricted to modern prostheses

Table SSR167 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Augmentation (All Diagnoses)

Glenoid Augmentation	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Custom	39	317	8.9 (6.2, 12.7)	11.4 (8.2, 15.7)	12.8 (9.2, 17.6)	14.1 (10.0, 19.8)		
Augmented	232	9803	1.7 (1.5, 2.0)	2.8 (2.5, 3.3)	3.7 (3.1, 4.3)	6.0 (4.6, 7.8)		
Standard	2092	54516	2.3 (2.2, 2.4)	3.5 (3.3, 3.7)	4.1 (3.9, 4.3)	4.6 (4.4, 4.8)	5.4 (5.2, 5.7)	6.4 (5.9, 7.0)
TOTAL	**2363**	**64636**						

Note: Restricted to modern prostheses

Figure SSR118 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Augmentation (All Diagnoses)



HR - adjusted for age and gender

Custom vs Augmented

0 - 6Mth: HR=4.18 (95% CI 2.63, 6.64), p<0.001

6Mth+: HR=2.10 (95% CI 1.28, 3.44), p=0.003

Custom vs Standard

Entire Period: HR=2.38 (95% CI 1.72, 3.29), p<0.001

Standard vs Augmented

0 - 3Mth: HR=1.94 (95% CI 1.54, 2.45), p<0.001

3Mth+: HR=0.97 (95% CI 0.82, 1.14), p=0.705

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Custom	317	247	166	97	43	8	1
Augmented	9803	6562	2693	914	144	10	0
Standard	54516	46851	34097	22661	13118	4623	723

Note: Restricted to modern prostheses

Patient Reported Outcome Measures of Shoulder Replacement

Patient reported outcome measures (PROMs) are surveys that assess dimensions of health from the perspective of the patient. These are additional joint replacement outcomes that are reported directly by patients through a bespoke electronic data capture system. PROMs data collection commenced with a pilot study in September 2017.[4] The system is currently being implemented nationally in all hospitals undertaking joint replacement surgery.

Several different instruments are used to collect data on patients' quality of life and joint-specific pain, function, and recovery. This year, PROMs data are reported for primary stemmed anatomic shoulder, and primary total stemmed reverse shoulder replacement undertaken for osteoarthritis (OA), and primary reverse total shoulder replacement undertaken for rotator cuff arthropathy.

The data are presented overall for each category of joint replacement as well as for the two shoulder diagnoses assessed, and their variations by age and gender. Individual surgeon and individual hospital (both de-identified) pre-operative quality of life and joint-specific scores are also reported for primary total stemmed reverse shoulder replacement only as the most common/frequent procedure groups.

The 2025 Patient Reported Outcome Measures is based on the analysis of procedures using prostheses that were available and used in 2024 (described as modern prostheses) with a procedure date up to and including 31 December 2024. There are 2,568 pre-operative and 1,894 post-operative PROMs for primary total stemmed anatomic and primary total stemmed reverse shoulder procedures performed for osteoarthritis and rotator cuff arthropathy.

Information on the background, purpose, aims, benefits and governance of the Registry can be found in the Introduction of the 2025 Hip, Knee and Shoulder Arthroplasty Annual Report.

The Registry data quality processes including data collection, validation and outcomes assessment, are provided in detail in the data quality section of the 2025 Hip, Knee and Shoulder Arthroplasty Annual Report: https://aoanjrr.sahmri.com/annual-reports-2025.

[4] https://aoanjrr.sahmri.com/proms-pilot-report

PROMs Instruments

The list of instruments used for AOANJRR PROMs collection are provided in Table SSR168.

The Oxford Hip Score, Oxford Knee Score and Oxford Shoulder Score are standardised and validated PROM instruments developed to assess joint-specific function and pain in patients undergoing total joint replacement surgery.

HOOS-12 and KOOS-12 results are not presented in this report, as they are administered as optional measures.

More detail about the PROMs instruments can be found in AOA PROMs Pilot Project Final Report: https://aoanjrr.sahmri.com/proms-pilot-report.

Table SSR168 Data Captured in the Minimum Dataset for PROMs Collection

Measurement Tool	Scoring	Applied to Hip (H), Knee (K) or Shoulder (S)
EQ-5D (Quality of Life)		
Usual activities	5 response options	H, K, S
Mobility	5 response options	H, K, S
Pain	5 response options	H, K, S
Depression / Anxiety	5 response options	H, K, S
Quality of life	5 response options	H, K, S
EQ-VAS (general health rating)	0-100	H, K, S
Oxford Hip Score	0-48	H
Oxford Knee Score	0-48	K
Oxford Shoulder Score	0-48	S
HOOS-12		H (optional)
KOOS-12		K (optional)
Joint-specific pain (last 7 days)	0-10	H, K, S
Low back pain (last 7 days)	0-10	H, K
Neck pain (last 7 days)	0-10	S
Expectation for pain, 6 months post-surgery	0-10	H, K, S
Expectation for mobility, 6 months post-surgery	5 categories	H, K, S
Expectation for health, 6 months post-surgery	0-100	H, K, S
Pre-operative patient-reported coincidental issues walking	Yes/No	H, K
Pre-operative patient-reported problems with the contralateral side	Yes/No	H, K, S
Satisfaction with the results of the procedure	5 categories	H, K, S
Improvement (in problems with joint compared to before surgery)	5 categories	H, K, S

Shoulder Replacement Summary

In this section, PROMs outcomes for primary total stemmed anatomic and primary total stemmed reverse shoulder replacement overall are compared.

More detailed analyses of the association between patient factors and PROMs for stemmed reverse shoulder replacement used for the management of osteoarthritis and rotator cuff arthropathy are also presented. However, similar detailed analyses for total stemmed anatomic and total stemless shoulder replacement are not yet available, due to limited data for these classes of prostheses.

There are insufficient data to report surgeon and hospital variation in pre-operative Oxford Scores between hospitals and between surgeons for total stemmed shoulder replacements.

COMPARISON OF PRIMARY TOTAL STEMMED ANATOMIC AND PRIMARY TOTAL STEMMED REVERSE SHOULDER REPLACEMENT

The EQ-VAS and EQ-5D-5L are measures of quality of life. EQ-VAS is a measure of patient reported health, and ranges from 0 (worst health imaginable) to 100 (best health imaginable).

Total stemmed anatomic shoulder replacement has a similar pre-operative EQ-VAS to that observed for total stemmed reverse procedures. The mean improvement in EQ-VAS score following surgery is similar for both classes of shoulder replacement (Table SSR169 and Figure SSR119).

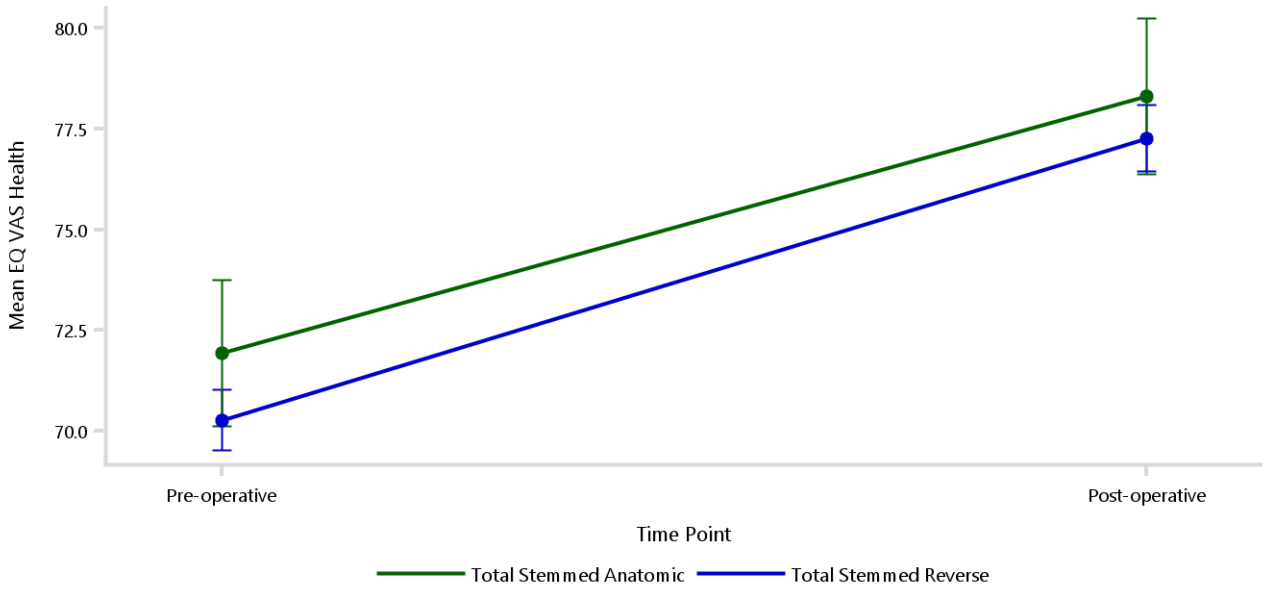
The percentage of total stemmed anatomic shoulder replacement patients who reported being better, worse or no different post-operatively compared to their pre-operative response for each of the EQ-5D domains and the EQ-VAS is shown in Figure SSR120. The corresponding percentages for patients who underwent primary total stemmed reverse shoulder replacement are shown in Figure SSR125.

Table SSR169 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)

Type of Primary	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Total Stemmed Anatomic	387	71.93 (70.12, 73.74)	298	78.31 (76.37, 80.25)	6.39 (4.30, 8.47)
Total Stemmed Reverse	2181	70.26 (69.51, 71.02)	1596	77.27 (76.44, 78.10)	7.01 (6.11, 7.91)

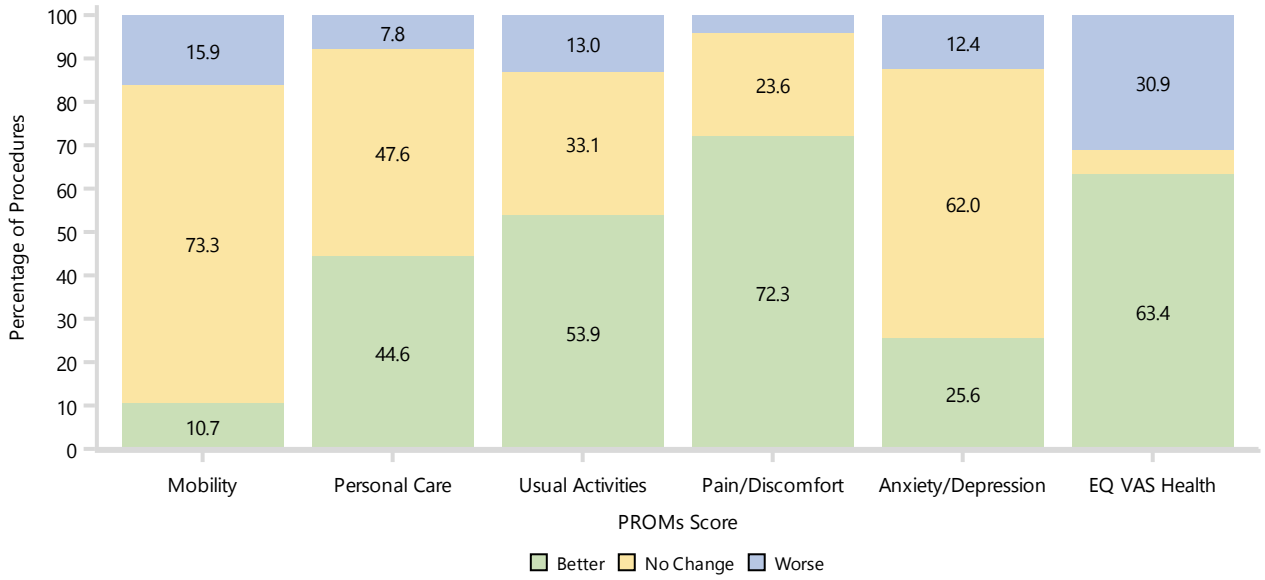
Note: Restricted to modern prostheses
Adjusted for age and gender

Figure SSR119 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)



Note: Restricted to modern prostheses
Adjusted for age and gender

Figure SSR120 Change in EQ-5D-5L Domain Score and EQ-VAS Health in Primary Total Stemmed Anatomic Shoulder Replacement (Primary Diagnosis OA)



Note: Restricted to modern prostheses

Oxford Score

The Oxford Shoulder Score (OSS) provides a joint specific score of pain and function. The OSS totals the responses from 12 questions, each on a 5-level scale of 0 (worst possible score) to 4 (best possible score). OSS scores before and 6 months after surgery for the two shoulder classes are provided in Table SSR170 and shown graphically in Figure SSR121. The mean preoperative Oxford scores were 24.1 and 23.6 for total stemmed anatomic and total stemmed reverse shoulder replacements, while the postoperative mean scores were 39.6 and 39.1 for these groups, respectively.

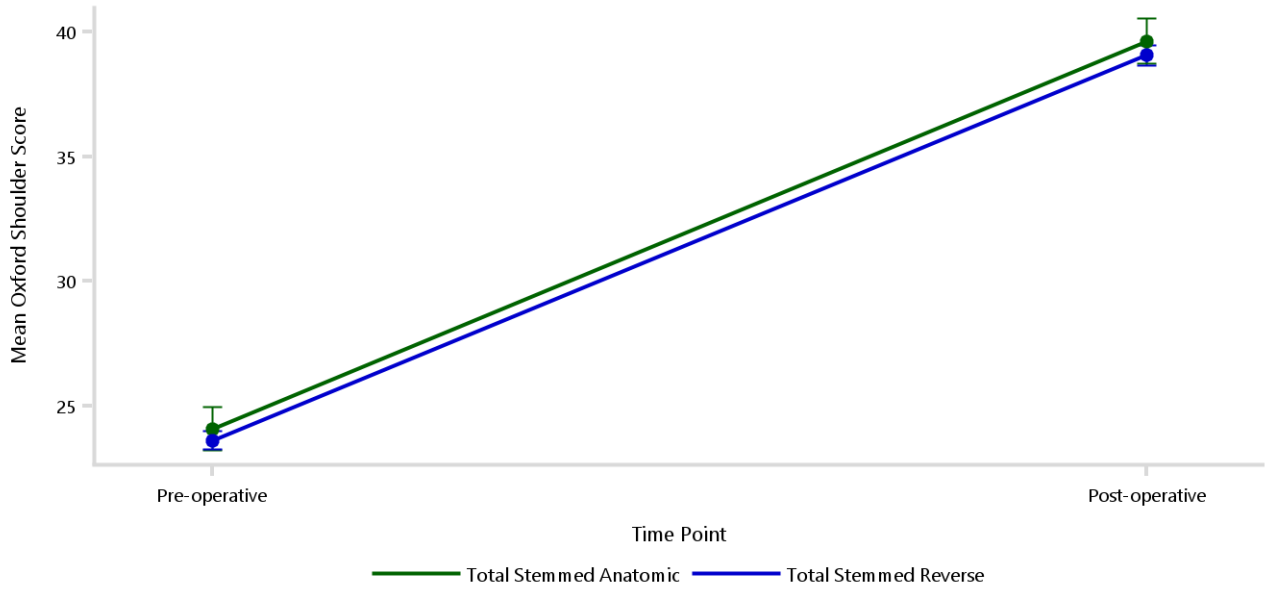
There is no difference in the pre- or post-operative score between shoulder classes and the mean change in score is just over 15 points.

Table SSR170 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)

Type of Primary	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Total Stemmed Anatomic	387	24.08 (23.21, 24.94)	297	39.63 (38.72, 40.54)	15.55 (14.50, 16.61)
Total Stemmed Reverse	2188	23.62 (23.26, 23.98)	1604	39.06 (38.67, 39.45)	15.44 (14.99, 15.89)

Note: Restricted to modern prostheses
Adjusted for age and gender

Figure SSR121 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)



Note: Restricted to modern prostheses
Adjusted for age and gender

Patient Satisfaction and Change

Patients were surveyed at 6 months post-operatively on how satisfied they were with their primary total stemmed shoulder replacement, and on their perceived change in their shoulder after surgery.

After primary total stemmed anatomic shoulder replacement, 90.5% of patients were either very satisfied or satisfied. After primary total stemmed reverse shoulder replacement, 88.3% of patients were either very satisfied or satisfied (Table SSR171 and Figure SSR122).

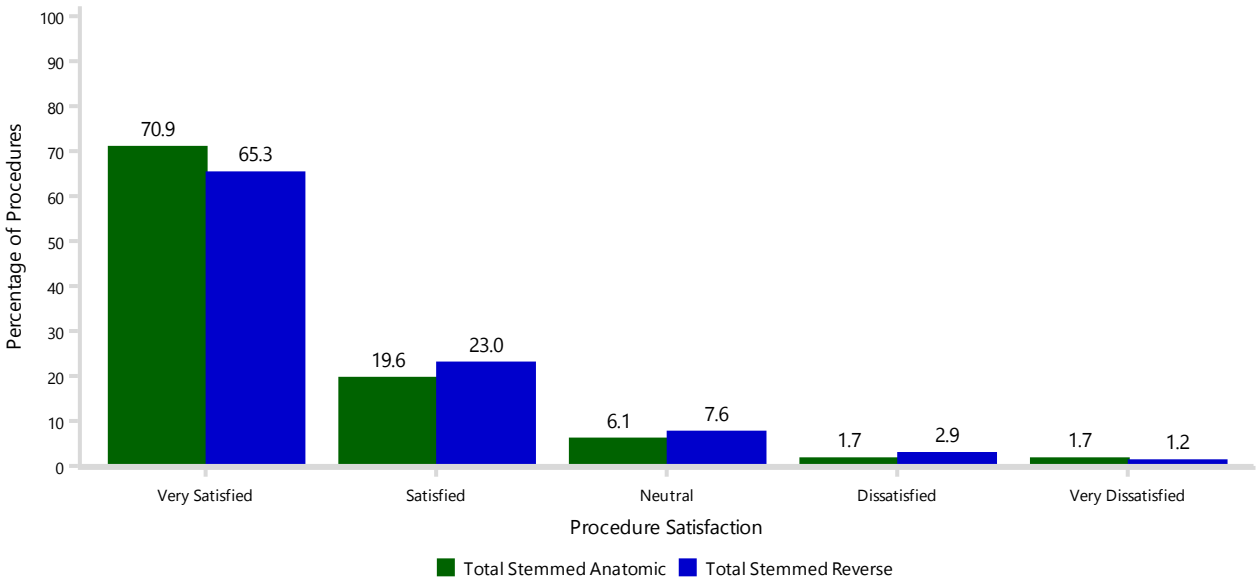
There was a high percentage (94.6%) of patients who rated their primary total stemmed anatomic shoulder replacement as much better or a little better. Similarly, patient-reported change after total stemmed reverse shoulder replacement was largely much better or a little better (93.3%) (Table SSR172 and Figure SSR123).

Table SSR171 Procedure Satisfaction in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)

Type of Primary	Very Satisfied			Satisfied			Neutral			Dissatisfied			Very Dissatisfied			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Total Stemmed Anatomic	210	70.9	16.7	58	19.6	13.6	18	6.1	12.9	5	1.7	9.8	5	1.7	20.0	296	100.0	15.6
Total Stemmed Reverse	1045	65.3	83.3	368	23.0	86.4	122	7.6	87.1	46	2.9	90.2	20	1.2	80.0	1601	100.0	84.4
TOTAL	**1255**	**66.2**	**100.0**	**426**	**22.5**	**100.0**	**140**	**7.4**	**100.0**	**51**	**2.7**	**100.0**	**25**	**1.3**	**100.0**	**1897**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR122 Procedure Satisfaction in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)



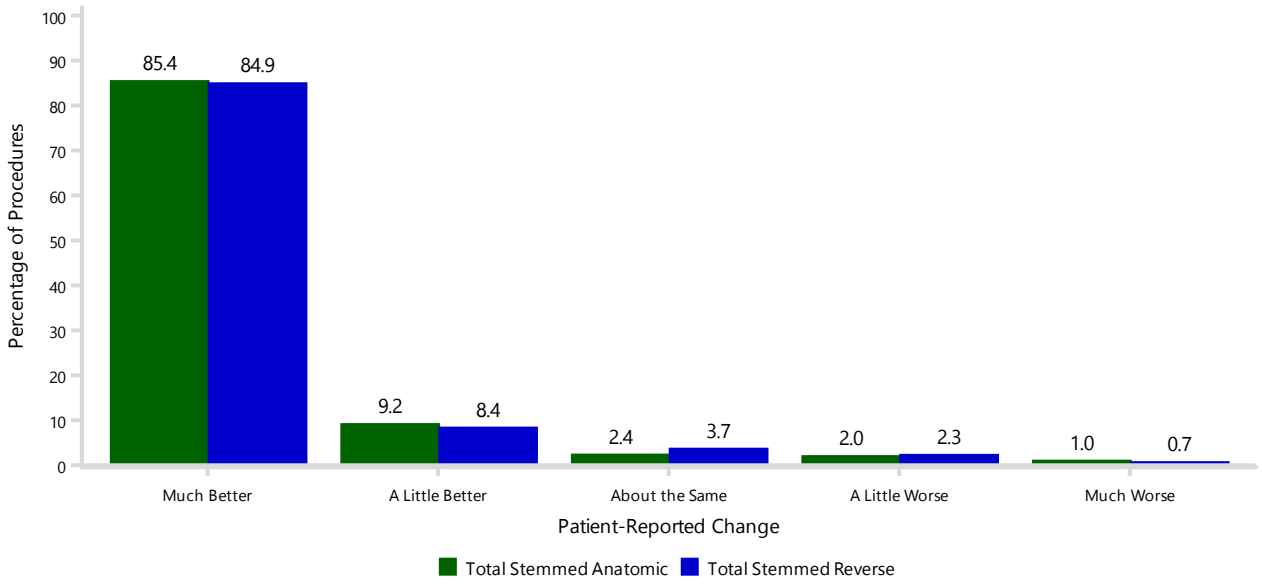
Note: Restricted to modern prostheses

Table SSR172 Patient-Reported Change in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)

Type of Primary	Much Better			A Little Better			About the Same			A Little Worse			Much Worse			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Total Stemmed Anatomic	252	85.4	15.6	27	9.2	16.8	7	2.4	10.6	6	2.0	14.0	3	1.0	21.4	295	100.0	15.6
Total Stemmed Reverse	1359	84.9	84.4	134	8.4	83.2	59	3.7	89.4	37	2.3	86.0	11	0.7	78.6	1600	100.0	84.4
TOTAL	**1611**	**85.0**	**100.0**	**161**	**8.5**	**100.0**	**66**	**3.5**	**100.0**	**43**	**2.3**	**100.0**	**14**	**0.7**	**100.0**	**1895**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR123 Patient-Reported Change in Primary Total Stemmed Shoulder Replacement by Type of Primary (Primary Diagnosis OA)



Note: Restricted to modern prostheses

Primary Total Stemmed Reverse Shoulder Replacement for Osteoarthritis

PATIENT CHARACTERISTICS

EQ-VAS and EQ-5D-5L

The mean EQ-VAS score increased by 7 points following total stemmed reverse shoulder replacement for osteoarthritis (Table SSR173). The percentage change following surgery is shown in Figure SSR124, and the change in each domain of the EQ-5D-5L is shown in Figure SSR125.

Age <65 years and female gender are associated with lower pre-operative EQ-VAS scores. Improvement after surgery is greater for females (Table SSR174, Figure SSR126, Table SSR175 and Figure SSR127).

EQ-VAS for ASA scores 2 and 3 are reported. The pre-operative mean EQ-VAS is lower for ASA score 3 and the post operative EQ-VAS was also lower, but the magnitude of improvement is greater (Table SSR176 and Figure SSR128).

Compared to normal weight patients, patients with increasing obesity have lower mean pre- and post-operative EQ-VAS but larger improvements (Table SSR177 and Figure SSR129).

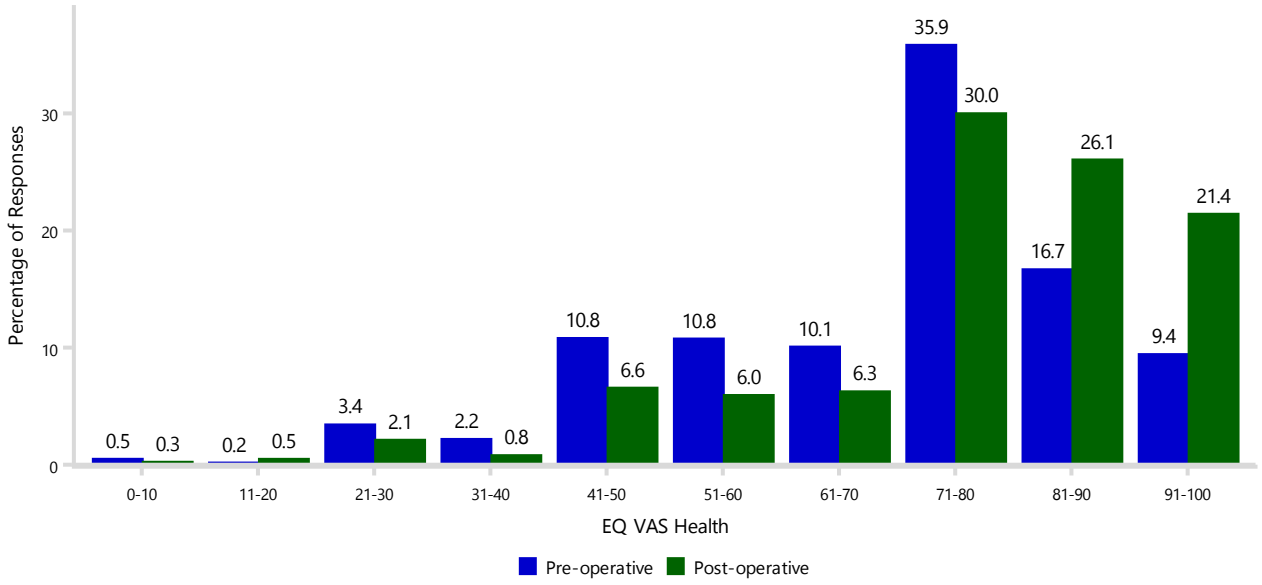
Glenoid morphology does not appear to impact the pre-operative mean EQ-VAS. The mean change in score is greatest for the B2 category (Table SSR178 and Figure SSR130).

Table SSR173 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)**

Class	Pre-operative			Post-operative		
	N	Mean (SD)	Median (Q1, Q3)	N	Mean (SD)	Median (Q1, Q3)
Total Stemmed Reverse	2181	70.08(17.86)	75.00 (59.00, 82.00)	1596	77.42(17.32)	80.00 (73.00, 90.00)

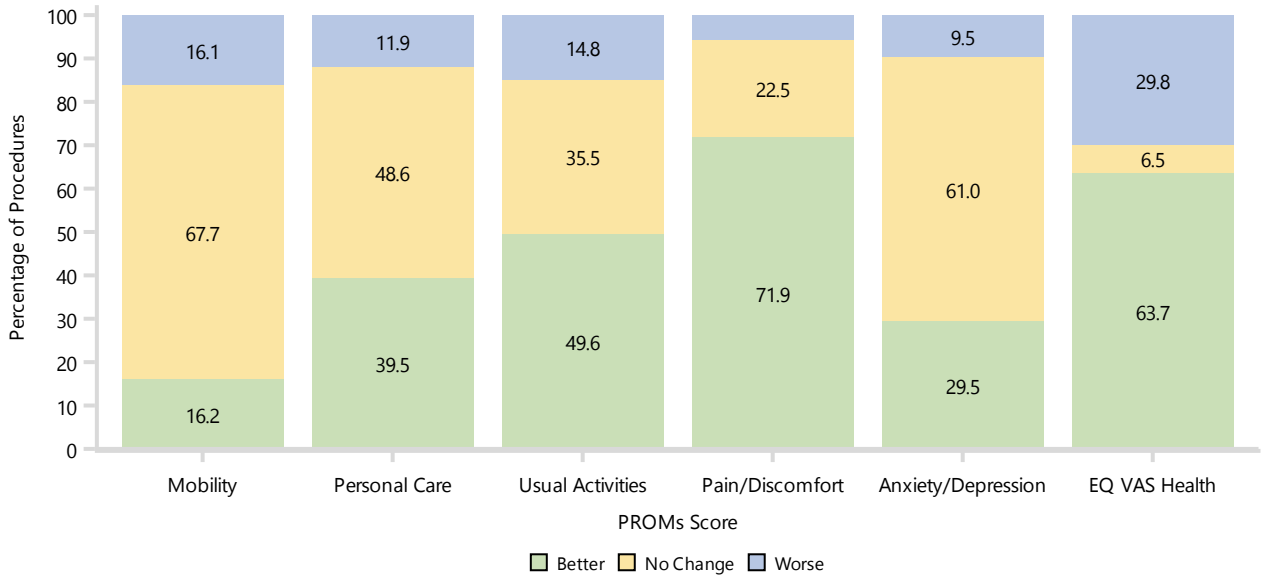
Note: Restricted to modern prostheses

Figure SSR124 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)**



Note: Restricted to modern prostheses

Figure SSR125 Change in EQ-5D-5L Domain Score and EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)



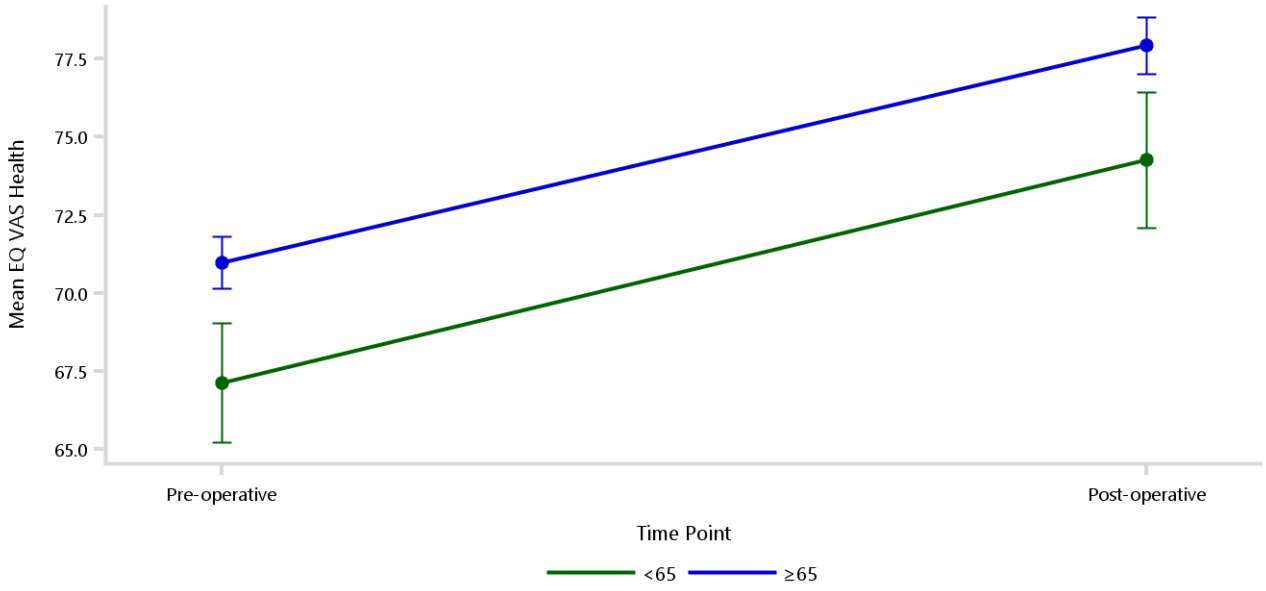
Note: Restricted to modern prostheses

Table SSR174 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)

Age	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
<65	331	67.13 (65.23, 69.03)	228	74.26 (72.09, 76.43)	7.13 (4.80, 9.46)
≥65	1850	70.98 (70.16, 71.80)	1368	77.92 (77.02, 78.83)	6.94 (5.97, 7.91)

Note: Restricted to modern prostheses
Adjusted for gender

Figure SSR126 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)



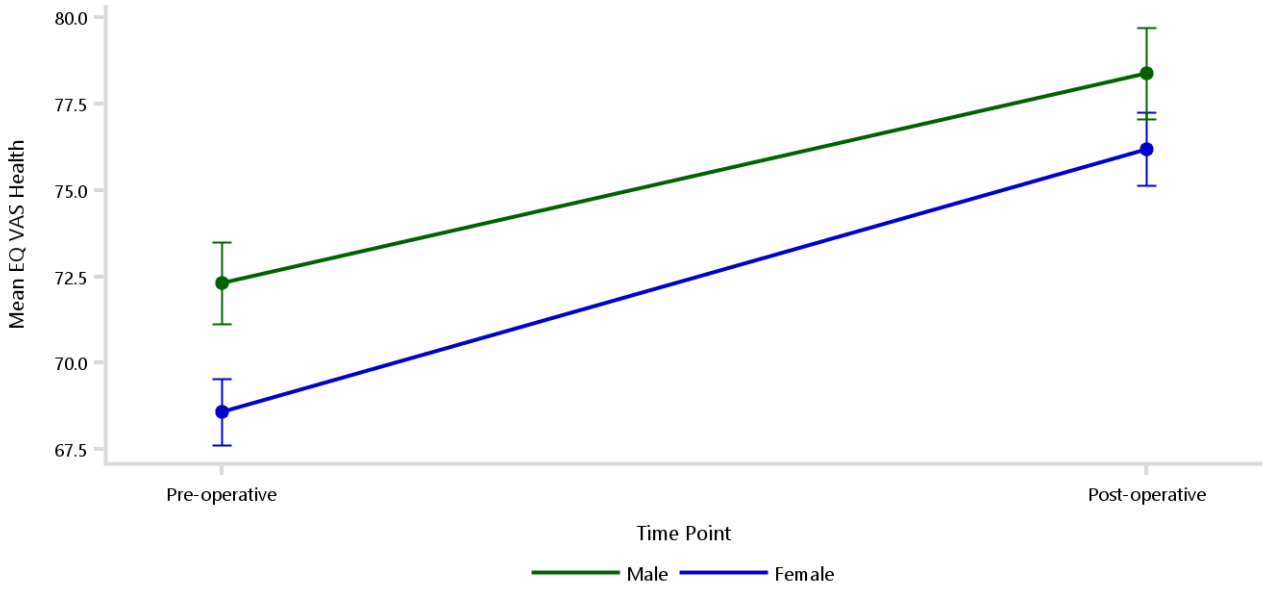
Note: Restricted to modern prostheses
Adjusted for gender

Table SSR175 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Male	866	72.31 (71.13, 73.49)	627	78.38 (77.06, 79.70)	6.07 (4.65, 7.49)
Female	1315	68.59 (67.63, 69.55)	969	76.18 (75.12, 77.24)	7.59 (6.44, 8.74)

Note: Restricted to modern prostheses
Adjusted for age

Figure SSR127 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)



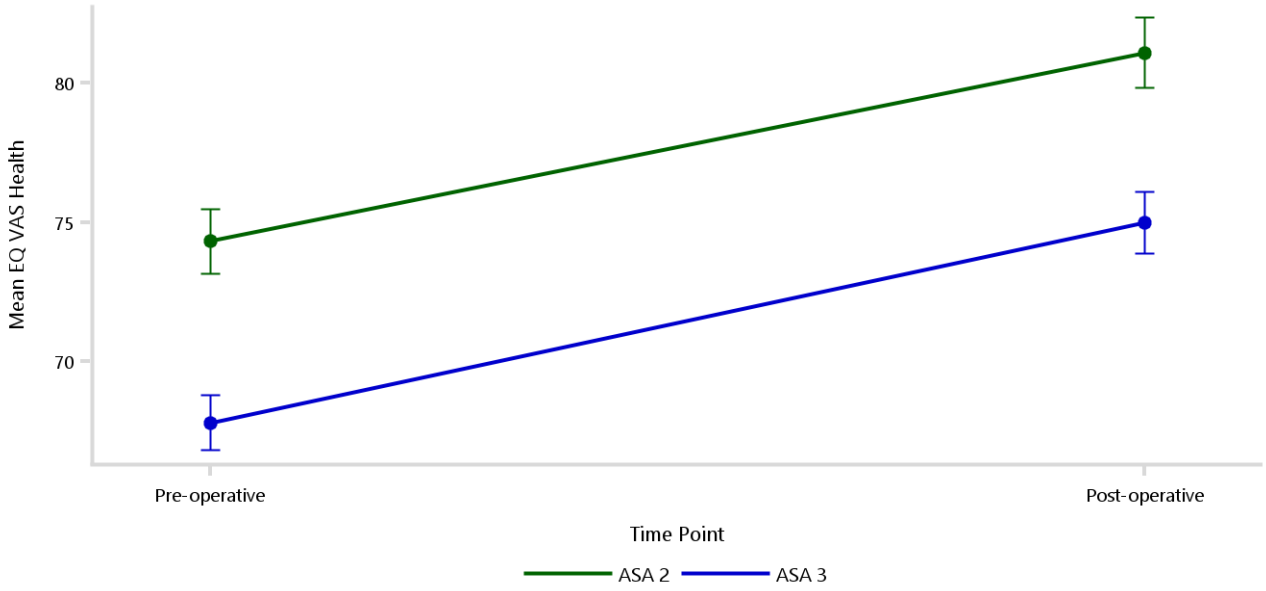
Note: Restricted to modern prostheses
Adjusted for age

Table SSR176 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis OA)

ASA Score	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
ASA 2	870	74.32 (73.16, 75.49)	655	81.09 (79.82, 82.36)	6.77 (5.39, 8.15)
ASA 3	1220	67.81 (66.82, 68.79)	870	75.00 (73.90, 76.09)	7.19 (5.99, 8.39)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Figure SSR128 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis OA)



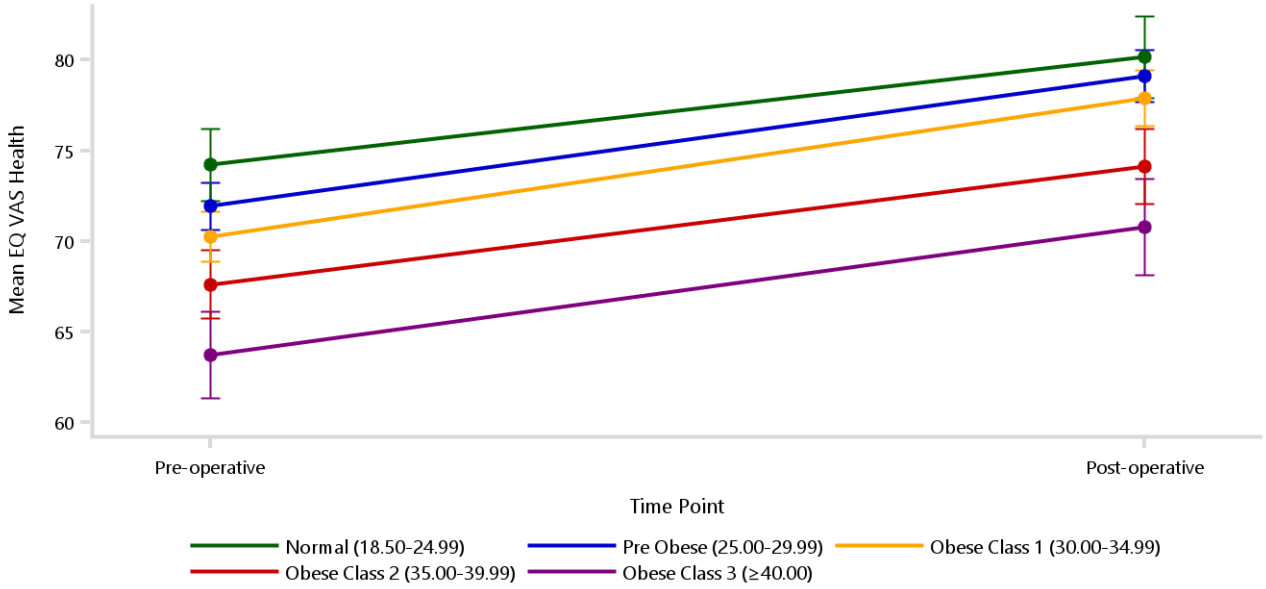
Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Table SSR177 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis OA)

BMI Category	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Normal (18.50-24.99)	305	74.23 (72.24, 76.21)	211	80.15 (77.90, 82.41)	5.93 (3.49, 8.36)
Pre Obese (25.00-29.99)	693	71.93 (70.63, 73.23)	517	79.14 (77.70, 80.57)	7.21 (5.63, 8.78)
Obese Class 1 (30.00-34.99)	609	70.27 (68.87, 71.66)	448	77.91 (76.36, 79.45)	7.64 (5.95, 9.34)
Obese Class 2 (35.00-39.99)	332	67.62 (65.74, 69.50)	249	74.12 (72.05, 76.20)	6.50 (4.21, 8.80)
Obese Class 3 (≥40.00)	212	63.72 (61.32, 66.12)	157	70.77 (68.12, 73.42)	7.05 (4.21, 9.90)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Figure SSR129 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis OA)



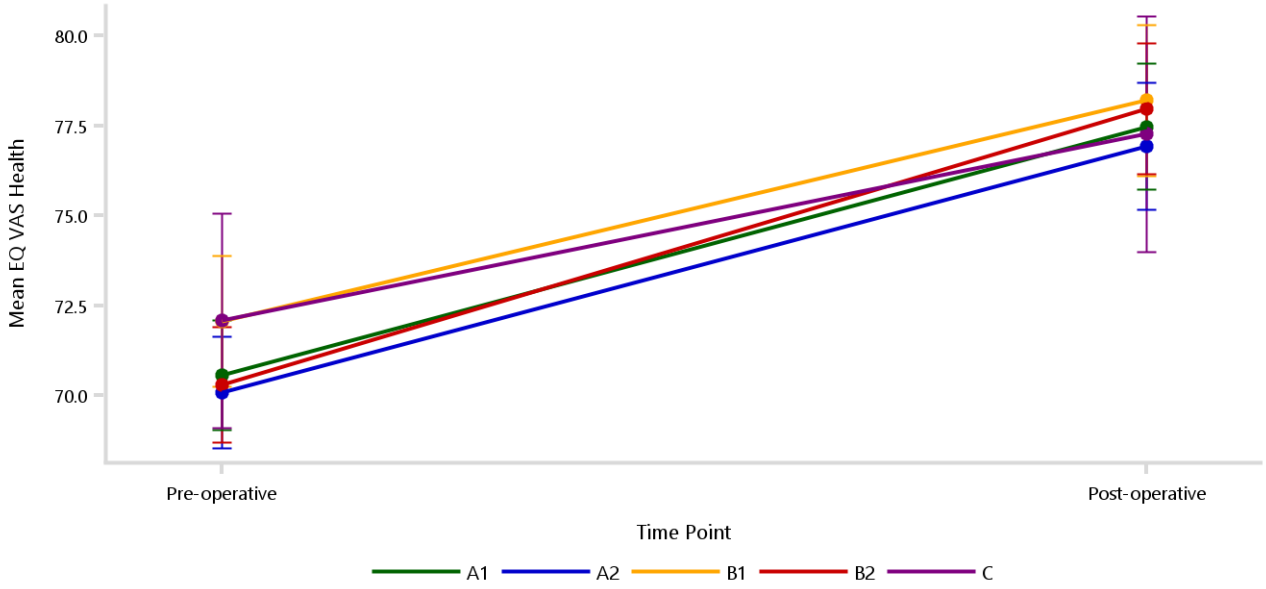
Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Table SSR178 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis OA)

Glenoid Morphology	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
A1	513	70.55 (69.02, 72.09)	369	77.48 (75.73, 79.23)	6.93 (5.08, 8.77)
A2	485	70.08 (68.52, 71.64)	358	76.93 (75.16, 78.69)	6.85 (4.97, 8.72)
B1	355	72.06 (70.24, 73.89)	251	78.21 (76.12, 80.30)	6.15 (3.93, 8.37)
B2	453	70.29 (68.68, 71.89)	334	77.97 (76.16, 79.79)	7.69 (5.75, 9.63)
C	130	72.08 (69.10, 75.07)	103	77.27 (74.00, 80.55)	5.19 (1.62, 8.75)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Figure SSR130 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis OA)



Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Oxford Score

The Oxford Shoulder Scores (OSS) before and 6 months after surgery are provided in Table SSR179.

Lower pre-operative mean OSS are associated with female gender. Higher post-operative scores occur in all subgroups compared to pre-operative, but the amount of change is greater for females and patients aged ≥65 years (Table SSR180, Figure SSR131, Table SSR181 and Figure SSR132).

OSS for ASA score 2 and ASA score 3 are presented. Pre-operative mean Oxford scores are lower for ASA score 3 and mean improvement after surgery is similar (Table SSR182 and Figure SSR133).

The pre-operative mean Oxford score is similar for the different BMI categories. The largest change in mean Oxford score is in obese class 2 and obese class 3 (Table SSR183 and Figure SSR134).

The pre- and post-operative OSS is not affected by glenoid morphology (Table SSR184 and Figure SSR135).

Table SSR179 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)

Class	Pre-operative			Post-operative		
	N	Mean (SD)	Median (Q1, Q3)	N	Mean (SD)	Median (Q1, Q3)
Total Stemmed Reverse	2188	23.32(8.90)	24.00 (17.00, 30.00)	1604	38.92(7.97)	41.00 (35.00, 45.00)

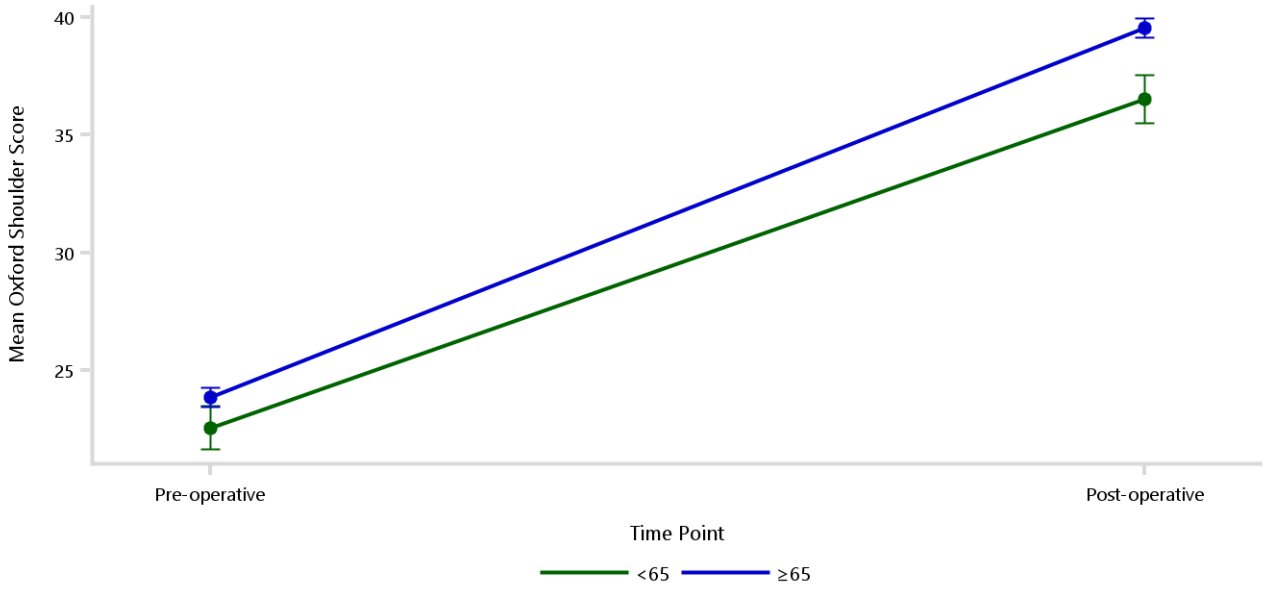
Note: Restricted to modern prostheses

Table SSR180 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)**

Age	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
<65	332	22.57 (21.65, 23.49)	228	36.53 (35.53, 37.54)	13.96 (12.79, 15.14)
≥65	1856	23.87 (23.47, 24.26)	1376	39.54 (39.12, 39.96)	15.68 (15.19, 16.16)

Note: Restricted to modern prostheses
Adjusted for gender

Figure SSR131 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)**



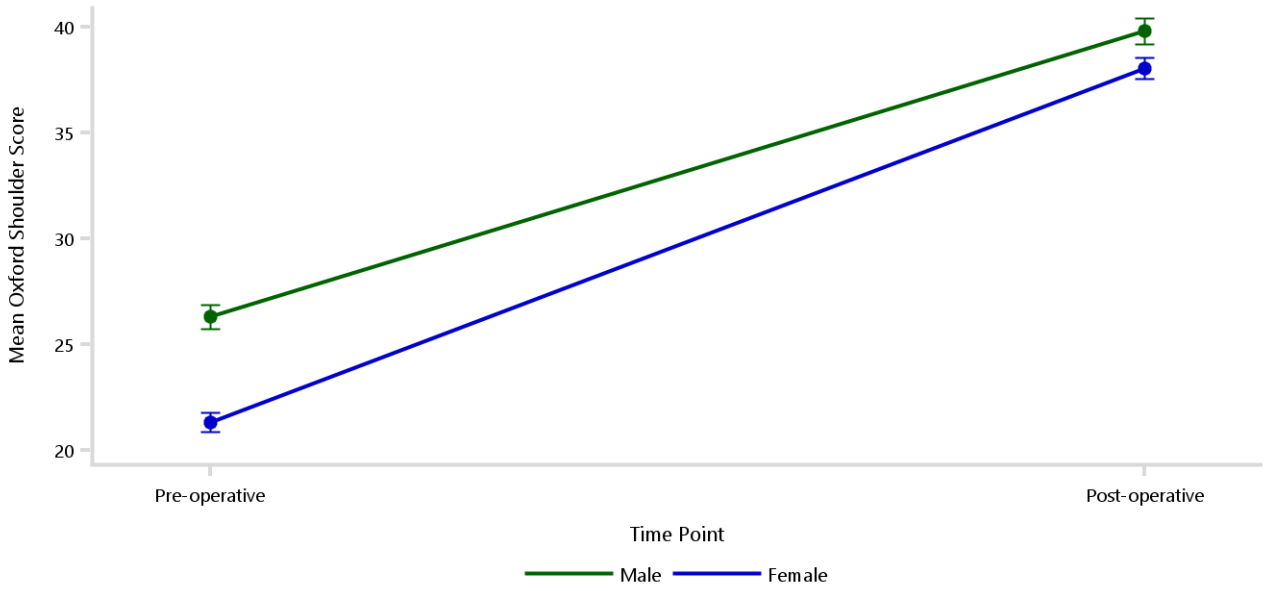
Note: Restricted to modern prostheses
Adjusted for gender

Table SSR181 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)**

Gender	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Male	871	26.30 (25.73, 26.87)	630	39.79 (39.18, 40.40)	13.48 (12.78, 14.19)
Female	1317	21.31 (20.85, 21.78)	974	38.03 (37.54, 38.52)	16.71 (16.14, 17.29)

Note: Restricted to modern prostheses
Adjusted for age

Figure SSR132 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)**



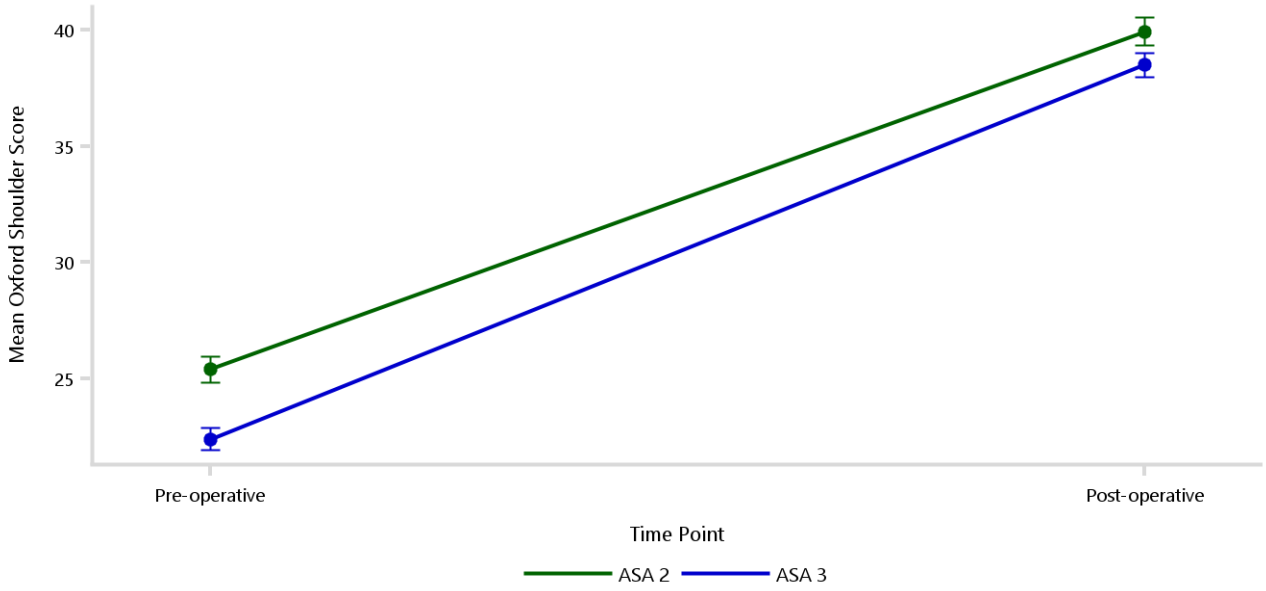
Note: Restricted to modern prostheses
Adjusted for age

Table SSR182 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis OA)**

ASA Score	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
ASA 2	873	25.41 (24.85, 25.98)	655	39.92 (39.31, 40.53)	14.51 (13.80, 15.21)
ASA 3	1226	22.42 (21.94, 22.90)	878	38.49 (37.96, 39.01)	16.07 (15.46, 16.67)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Figure SSR133 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis OA)**



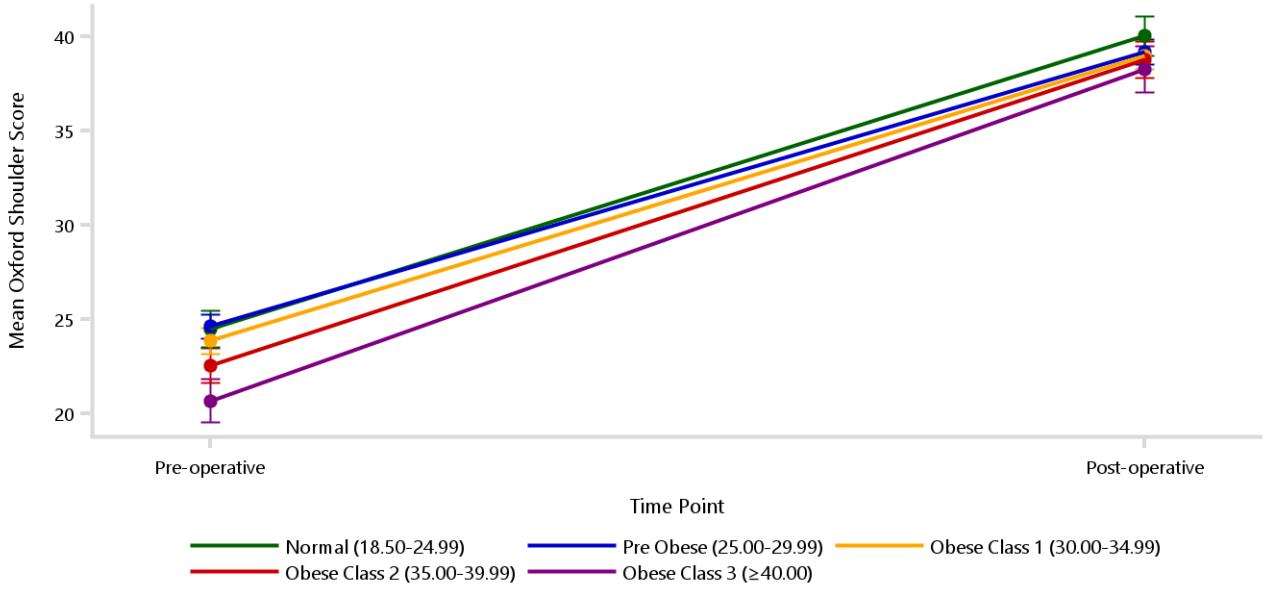
Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Table SSR183 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis OA)

BMI Category	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Normal (18.50-24.99)	309	24.48 (23.52, 25.44)	217	40.03 (38.99, 41.08)	15.55 (14.34, 16.76)
Pre Obese (25.00-29.99)	690	24.63 (23.99, 25.26)	515	39.19 (38.52, 39.87)	14.57 (13.77, 15.36)
Obese Class 1 (30.00-34.99)	615	23.84 (23.17, 24.52)	450	39.00 (38.28, 39.73)	15.16 (14.31, 16.01)
Obese Class 2 (35.00-39.99)	331	22.55 (21.63, 23.47)	250	38.78 (37.81, 39.75)	16.23 (15.08, 17.38)
Obese Class 3 (≥40.00)	213	20.67 (19.51, 21.84)	159	38.26 (37.03, 39.50)	17.59 (16.16, 19.02)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Figure SSR134 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis OA)



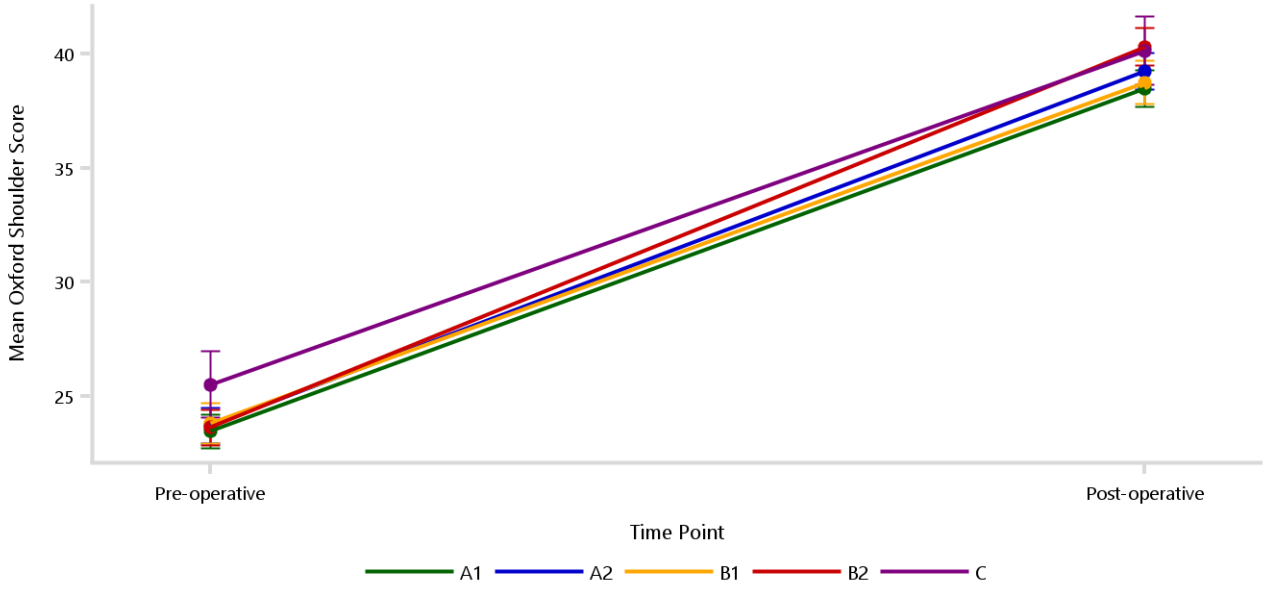
Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Table SSR184 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis OA)

Glenoid Morphology	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
A1	516	23.47 (22.72, 24.21)	372	38.50 (37.70, 39.29)	15.03 (14.11, 15.96)
A2	479	23.73 (22.96, 24.50)	362	39.24 (38.44, 40.03)	15.51 (14.56, 16.45)
B1	356	23.83 (22.94, 24.73)	251	38.76 (37.81, 39.72)	14.93 (13.81, 16.05)
B2	460	23.65 (22.87, 24.43)	337	40.31 (39.49, 41.13)	16.66 (15.69, 17.63)
C	132	25.53 (24.06, 26.99)	101	40.15 (38.65, 41.65)	14.62 (12.83, 16.42)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Figure SSR135 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis OA)



Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Satisfaction and Change

Patients were surveyed at 6 months post-operatively on how satisfied they were with their total stemmed reverse shoulder replacement for osteoarthritis, and on their perceived change in their shoulder after surgery.

After total stemmed reverse shoulder replacement, 88.3 of patients are very satisfied or satisfied (Table SSR185).

Procedure satisfaction by age and gender are presented in Table SSR186, Figure SSR136, Table SSR187 and Figure SSR137.

Patient-reported change is a little better or much better in 93.3% of total stemmed reverse shoulders (Table SSR188 and Figure SSR138). Patient-reported change by age and gender are presented in Table SSR189, Figure SSR139, Table SSR190 and Figure SSR140.

Table SSR185 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)

Class	Very Satisfied		Satisfied		Neutral		Dissatisfied		Very Dissatisfied		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Total Stemmed Reverse	1045	65.3	368	23.0	122	7.6	46	2.9	20	1.2	1601	100.0

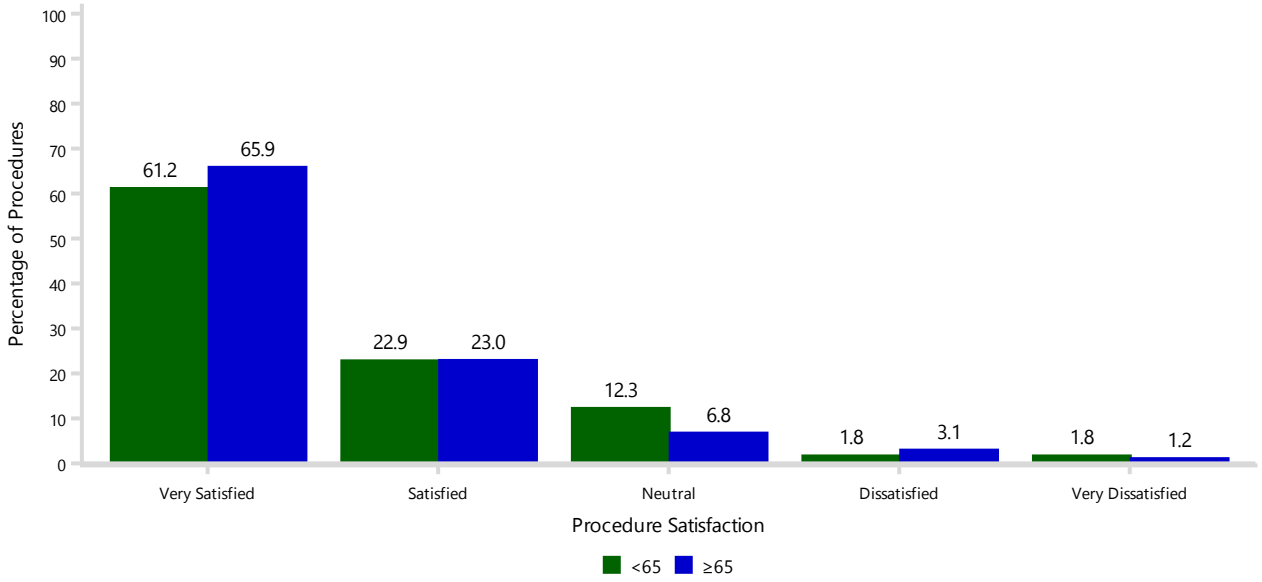
Note: Restricted to modern prostheses

Table SSR186 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)

Age	Very Satisfied			Satisfied			Neutral			Dissatisfied			Very Dissatisfied			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
<65	139	61.2	13.3	52	22.9	14.1	28	12.3	23.0	4	1.8	8.7	4	1.8	20.0	227	100.0	14.2
≥65	906	65.9	86.7	316	23.0	85.9	94	6.8	77.0	42	3.1	91.3	16	1.2	80.0	1374	100.0	85.8
TOTAL	**1045**	**65.3**	**100.0**	**368**	**23.0**	**100.0**	**122**	**7.6**	**100.0**	**46**	**2.9**	**100.0**	**20**	**1.2**	**100.0**	**1601**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR136 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)



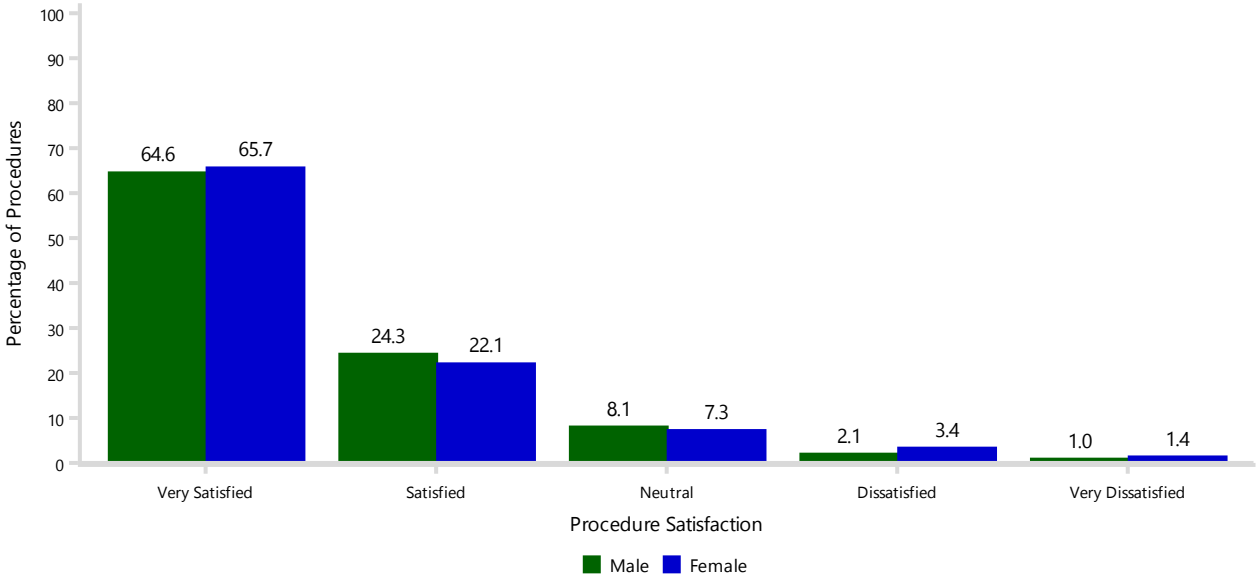
Note: Restricted to modern prostheses

Table SSR187 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	Very Satisfied			Satisfied			Neutral			Dissatisfied			Very Dissatisfied			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Male	407	64.6	38.9	153	24.3	41.6	51	8.1	41.8	13	2.1	28.3	6	1.0	30.0	630	100.0	39.4
Female	638	65.7	61.1	215	22.1	58.4	71	7.3	58.2	33	3.4	71.7	14	1.4	70.0	971	100.0	60.6
TOTAL	**1045**	**65.3**	**100.0**	**368**	**23.0**	**100.0**	**122**	**7.6**	**100.0**	**46**	**2.9**	**100.0**	**20**	**1.2**	**100.0**	**1601**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR137 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)



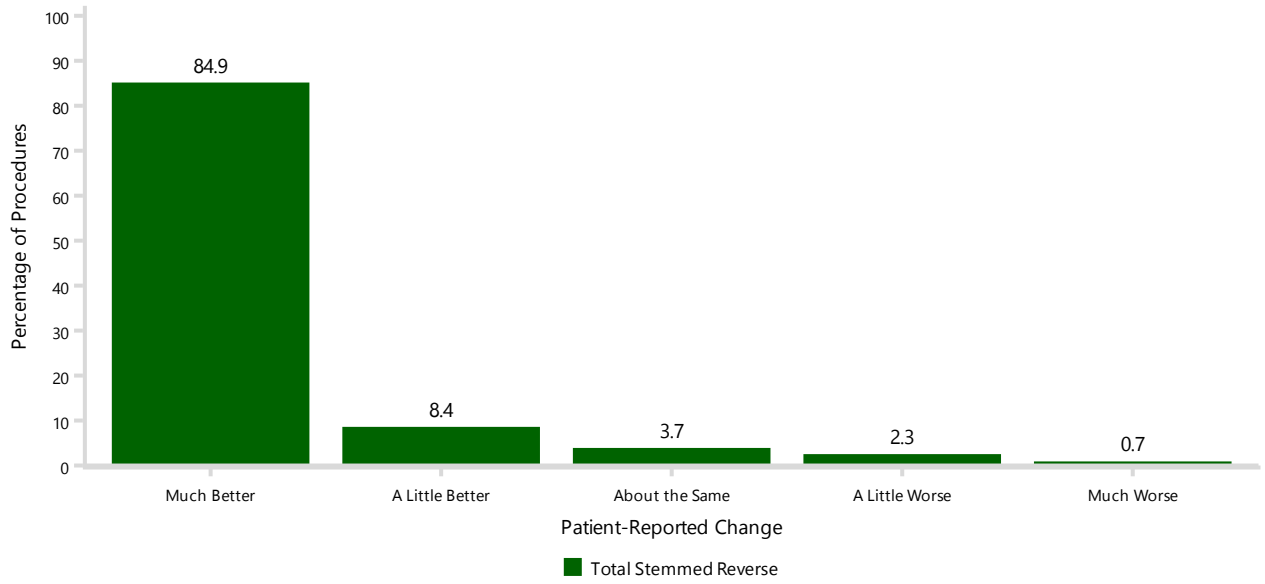
Note: Restricted to modern prostheses

Table SSR188 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)

Class	Much Better		A Little Better		About the Same		A Little Worse		Much Worse		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Total Stemmed Reverse	1359	84.9	134	8.4	59	3.7	37	2.3	11	0.7	1600	100.0

Note: Restricted to modern prostheses

Figure SSR138 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis OA)



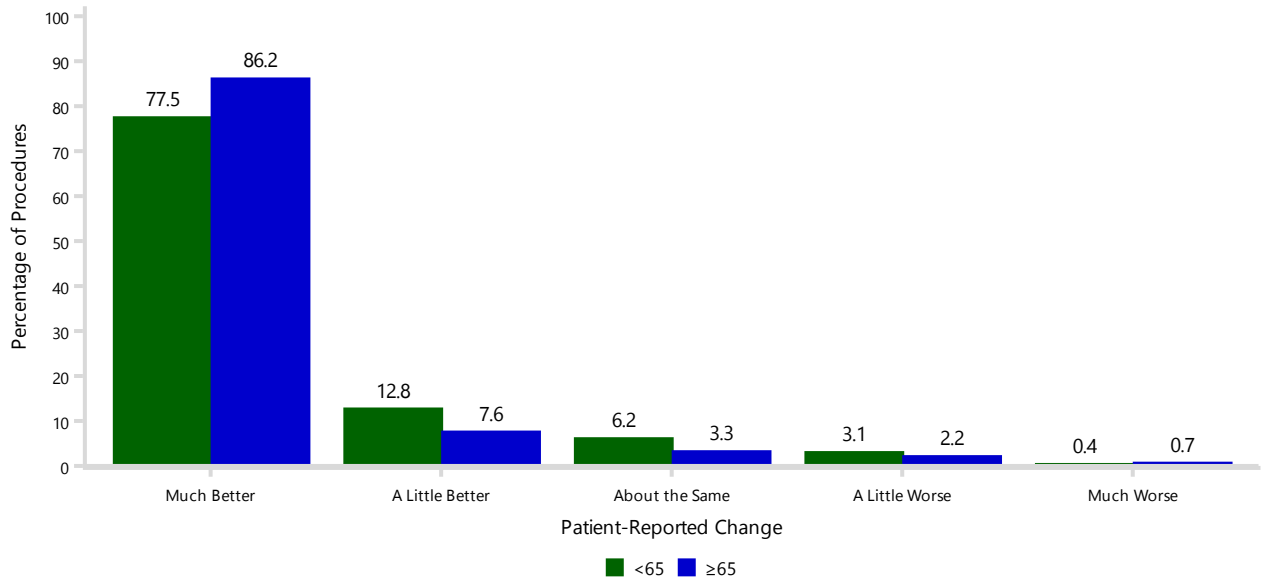
Note: Restricted to modern prostheses

Table SSR189 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)

Age	Much Better			A Little Better			About the Same			A Little Worse			Much Worse			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
<65	176	77.5	13.0	29	12.8	21.6	14	6.2	23.7	7	3.1	18.9	1	0.4	9.1	227	100.0	14.2
≥65	1183	86.2	87.0	105	7.6	78.4	45	3.3	76.3	30	2.2	81.1	10	0.7	90.9	1373	100.0	85.8
TOTAL	**1359**	**84.9**	**100.0**	**134**	**8.4**	**100.0**	**59**	**3.7**	**100.0**	**37**	**2.3**	**100.0**	**11**	**0.7**	**100.0**	**1600**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR139 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis OA)



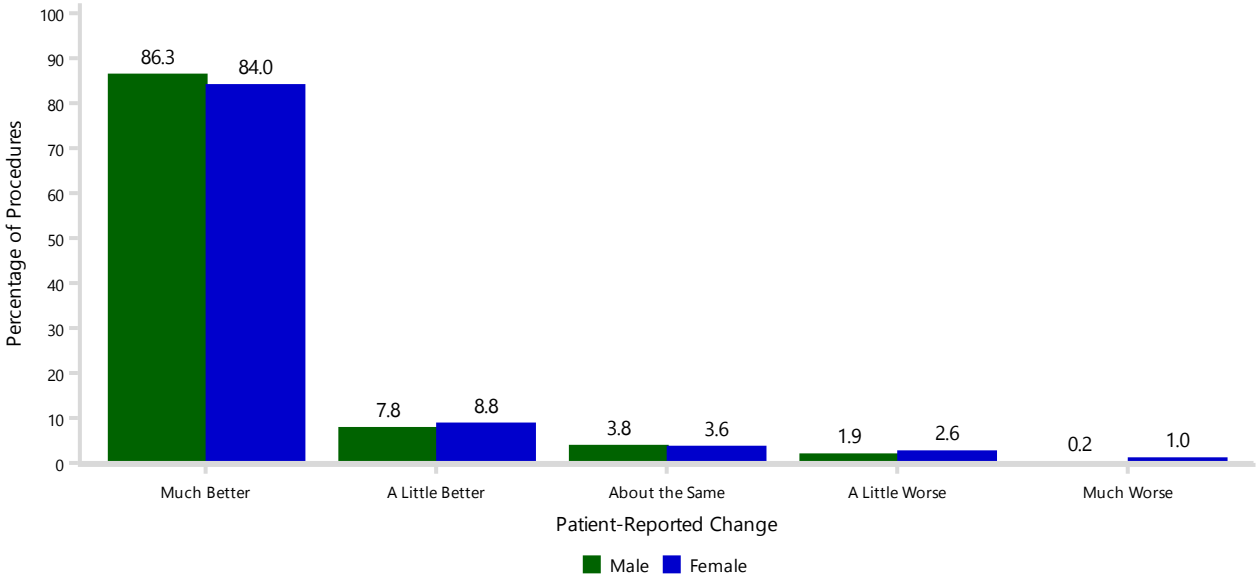
Note: Restricted to modern prostheses

Table SSR190 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)

Gender	Much Better			A Little Better			About the Same			A Little Worse			Much Worse			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Male	544	86.3	40.0	49	7.8	36.6	24	3.8	40.7	12	1.9	32.4	1	0.2	9.1	630	100.0	39.4
Female	815	84.0	60.0	85	8.8	63.4	35	3.6	59.3	25	2.6	67.6	10	1.0	90.9	970	100.0	60.6
TOTAL	**1359**	**84.9**	**100.0**	**134**	**8.4**	**100.0**	**59**	**3.7**	**100.0**	**37**	**2.3**	**100.0**	**11**	**0.7**	**100.0**	**1600**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR140 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis OA)



Note: Restricted to modern prostheses

PATIENT CHARACTERISTICS

EQ-VAS and EQ-5D-5L

The mean EQ-VAS score increased by just over 6 points following reverse shoulder replacement for rotator cuff arthropathy (Table SSR191). Scores before and 6 months after surgery are shown in Figure SSR141. The percentage of patients who reported being better, worse, or no different post-operatively compared to their pre-operative response for each of the EQ-5D domains and the EQ-VAS is shown in Figure SSR142.

The EQ-VAS score for gender is shown in Table SSR192 and Figure SSR143 and for age in Table SSR193 and Figure SSR144.

Pre-operative mean EQ-VAS decreases with increasing ASA score. The mean change in score was similar for ASA 2 and 3 (Table SSR194 and Figure SSR145).

The mean EQ-VAS assessment before surgery is lower in obese class 1, 2 and 3 patients compared to pre-obese. Obese class 2 patients have the smallest change following surgery, and class 3 the largest improvement (Table SSR195and Figure SSR146).

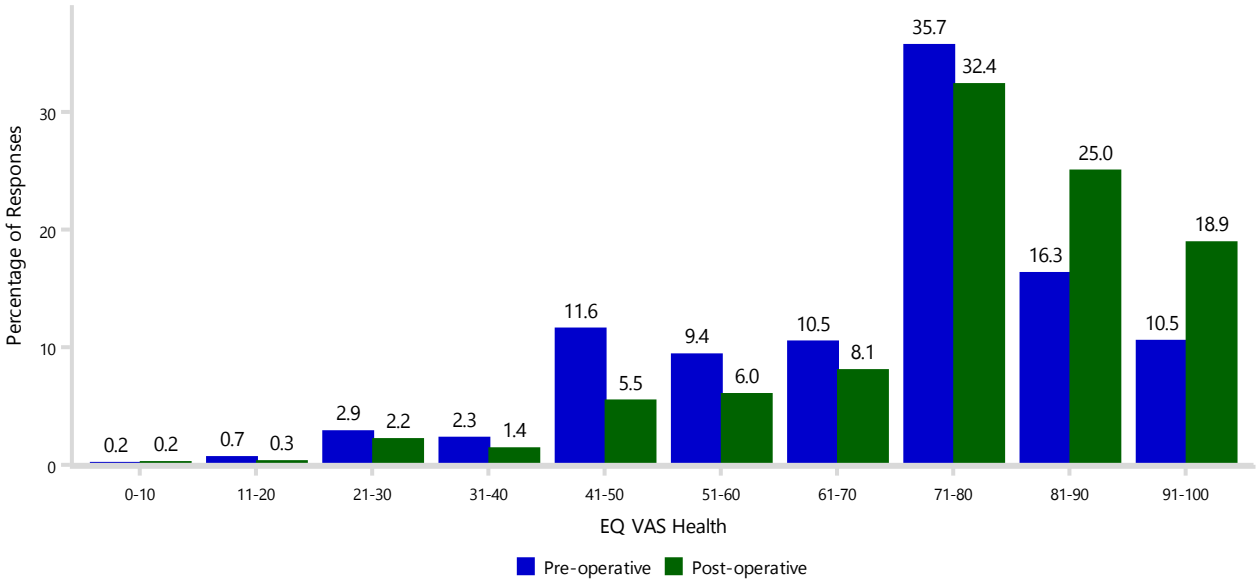
Glenoid morphology does not impact on pre- or post-operative EQ-VAS (Table SSR196 and Figure SSR147).

Table SSR191 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis Rotator Cuff Arthropathy)**

Class	Pre-operative			Post-operative		
	N	Mean (SD)	Median (Q1, Q3)	N	Mean (SD)	Median (Q1, Q3)
Total Stemmed Reverse	1821	70.56(17.73)	75.00 (59.00, 83.00)	1279	76.71(16.89)	78.00 (72.00, 89.00)

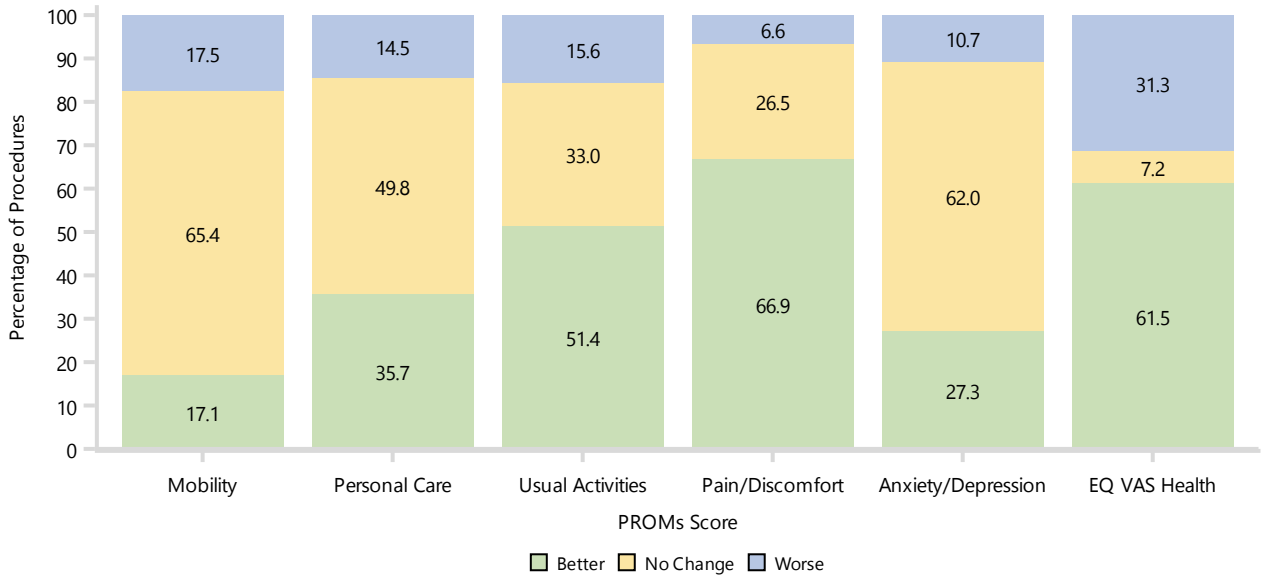
Note: Restricted to modern prostheses

Figure SSR141 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis Rotator Cuff Arthropathy)**



Note: Restricted to modern prostheses

Figure SSR142 Change in EQ-5D-5L Domain Score and EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis Rotator Cuff Arthropathy)



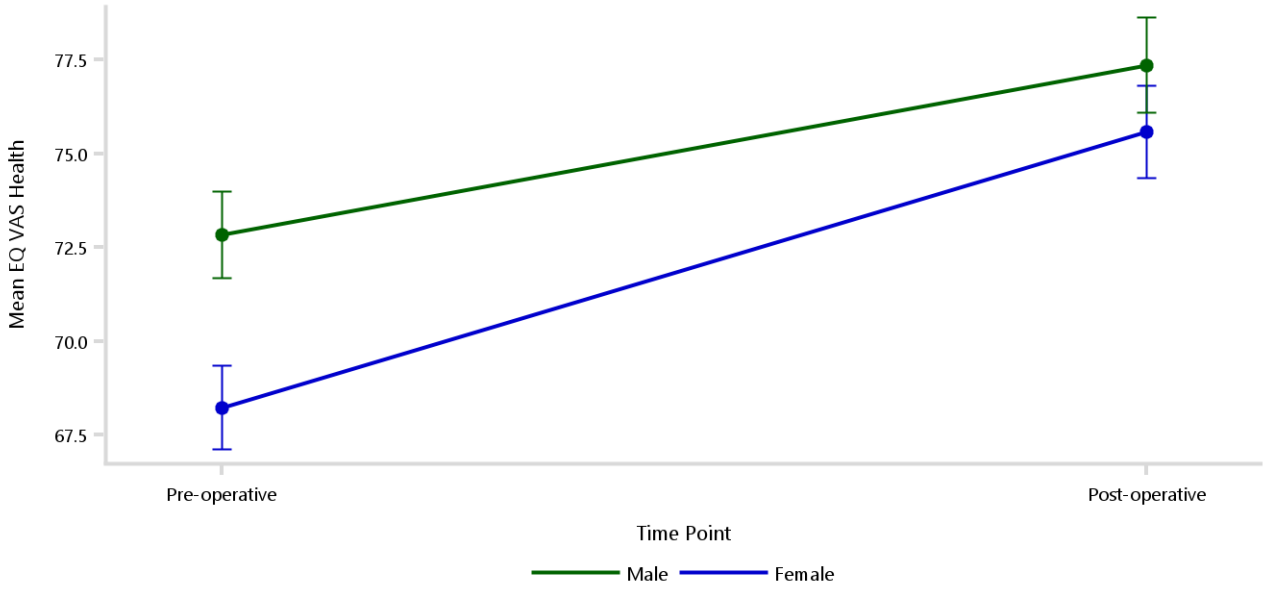
Note: Restricted to modern prostheses

Table SSR192 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)**

Gender	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Male	882	72.85 (71.70, 74.00)	620	77.36 (76.08, 78.63)	4.51 (3.14, 5.87)
Female	939	68.24 (67.12, 69.36)	659	75.58 (74.35, 76.82)	7.35 (6.03, 8.67)

Note: Restricted to modern prostheses
Adjusted for age

Figure SSR143 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)**



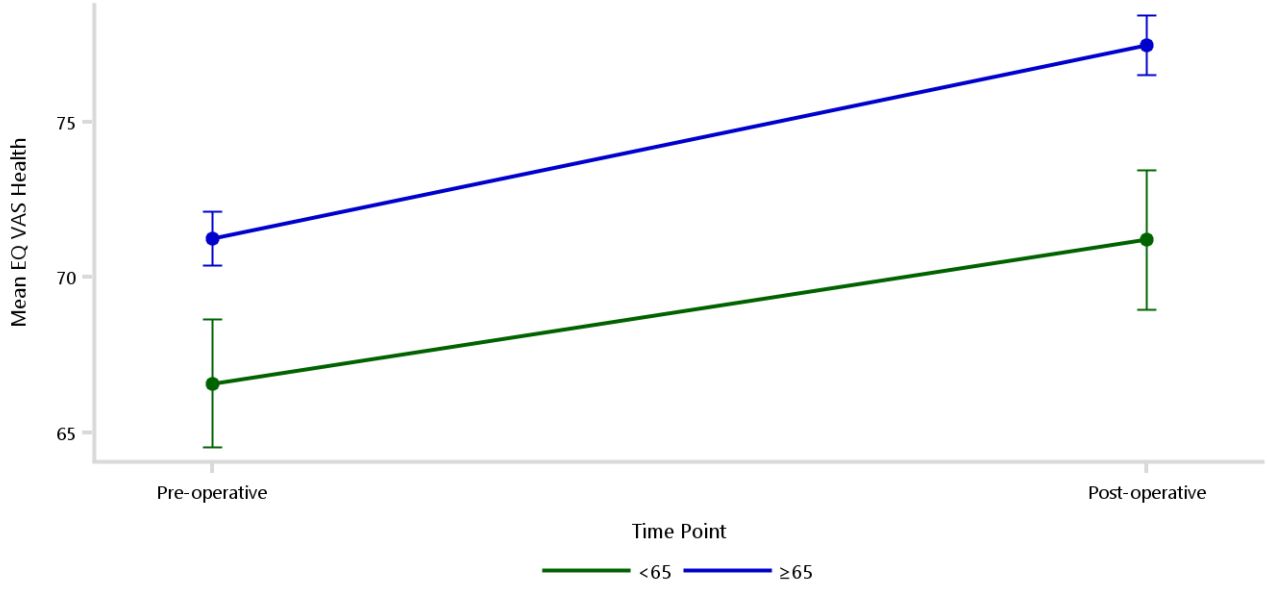
Note: Restricted to modern prostheses
Adjusted for age

Table SSR193 **Mean Pre-operative and Post-operative EQ VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)**

Age	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
<65	276	66.58 (64.53, 68.64)	199	71.20 (68.95, 73.46)	4.62 (2.21, 7.03)
≥65	1545	71.25 (70.38, 72.12)	1080	77.47 (76.51, 78.43)	6.22 (5.18, 7.25)

Note: Restricted to modern prostheses
Adjusted for gender

Figure SSR144 **Mean Pre-operative and Post-operative EQ VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)**



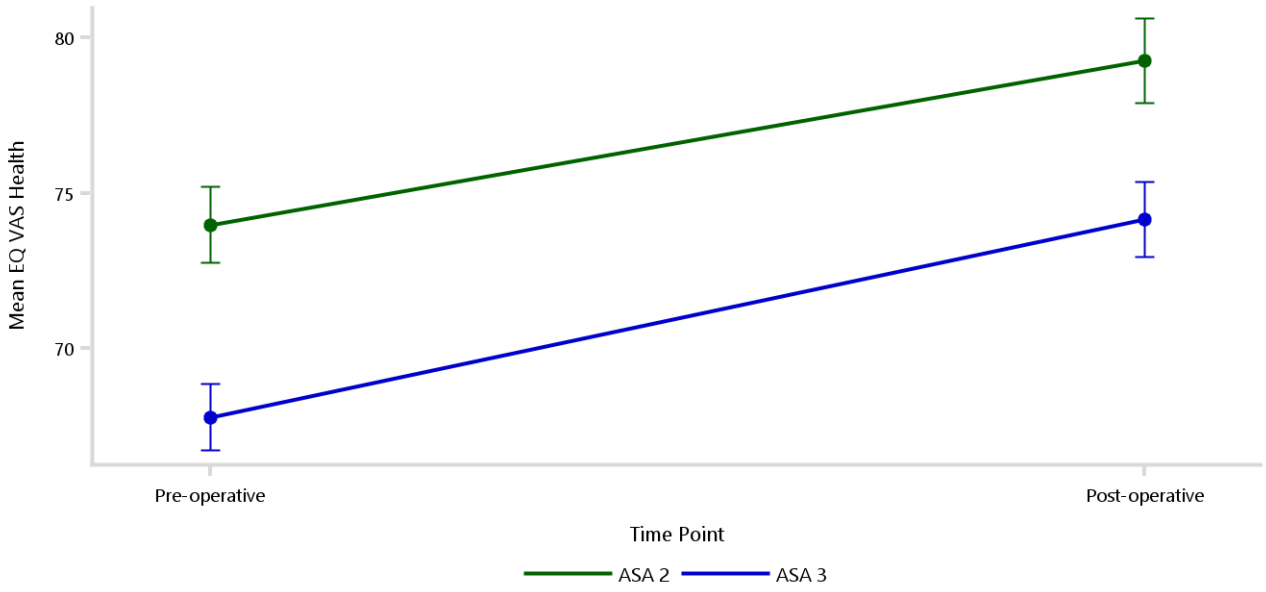
Note: Restricted to modern prostheses
Adjusted for gender

Table SSR194 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis Rotator Cuff Arthropathy)**

ASA Score	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
ASA 2	752	73.98 (72.76, 75.21)	529	79.26 (77.89, 80.63)	5.28 (3.81, 6.74)
ASA 3	976	67.80 (66.73, 68.87)	676	74.17 (72.97, 75.38)	6.37 (5.08, 7.67)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Figure SSR145 **Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis Rotator Cuff Arthropathy)**



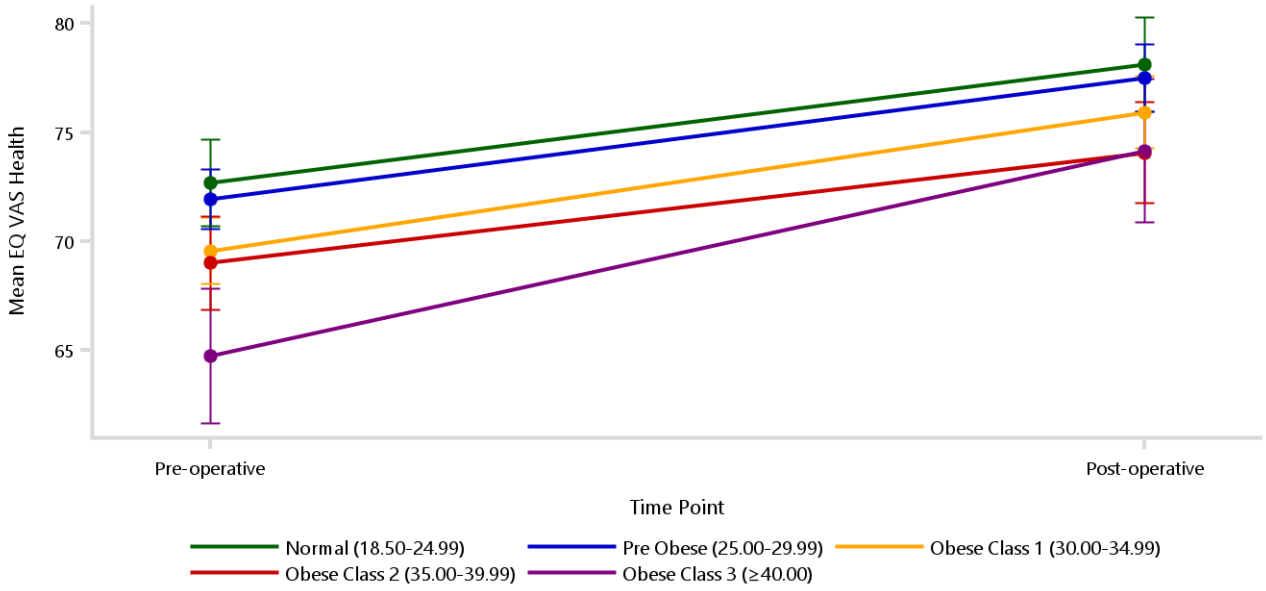
Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Table SSR195 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis Rotator Cuff Arthropathy)

BMI Category	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Normal (18.50-24.99)	299	72.69 (70.72, 74.67)	212	78.11 (75.95, 80.28)	5.42 (3.09, 7.74)
Pre Obese (25.00-29.99)	622	71.95 (70.58, 73.32)	411	77.49 (75.94, 79.04)	5.53 (3.87, 7.19)
Obese Class 1 (30.00-34.99)	497	69.56 (68.03, 71.08)	356	75.92 (74.26, 77.59)	6.37 (4.56, 8.17)
Obese Class 2 (35.00-39.99)	252	69.00 (66.85, 71.16)	188	74.07 (71.76, 76.39)	5.07 (2.60, 7.54)
Obese Class 3 (≥40.00)	123	64.74 (61.64, 67.84)	94	74.16 (70.86, 77.46)	9.42 (5.89, 12.94)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Figure SSR146 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis Rotator Cuff Arthropathy)



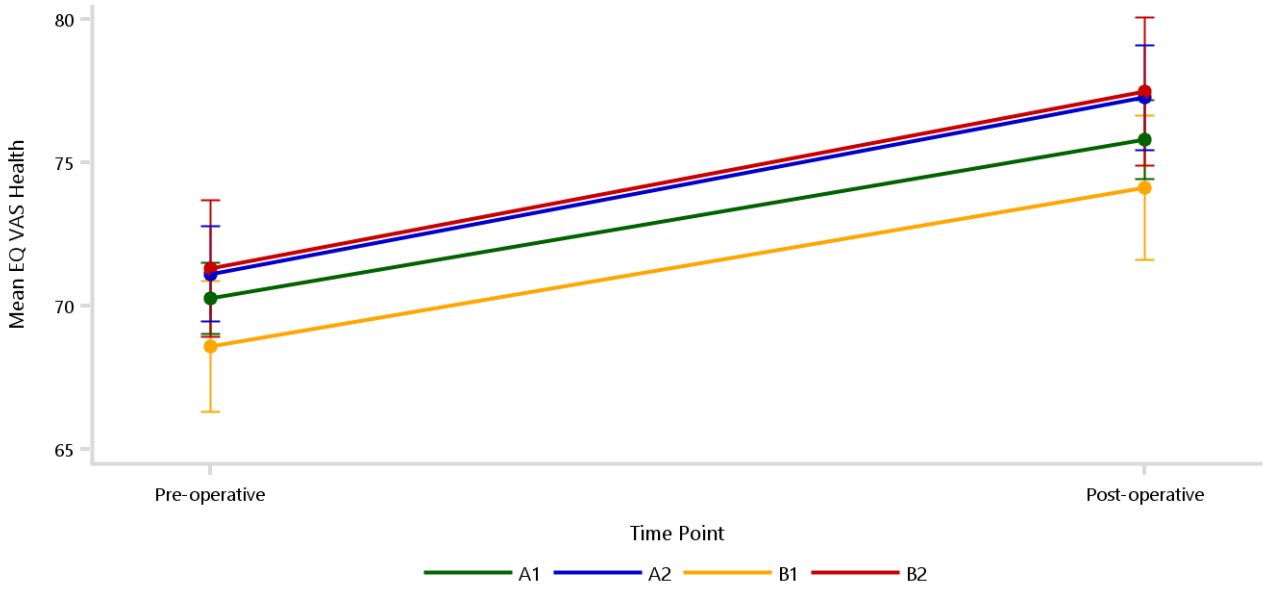
Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Table SSR196 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis Rotator Cuff Arthropathy)

Glenoid Morphology	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
A1	766	70.28 (69.04, 71.52)	540	75.82 (74.44, 77.20)	5.54 (4.08, 7.01)
A2	427	71.12 (69.46, 72.78)	303	77.29 (75.46, 79.12)	6.17 (4.20, 8.14)
B1	227	68.60 (66.32, 70.88)	160	74.15 (71.62, 76.67)	5.54 (2.86, 8.23)
B2	206	71.32 (68.92, 73.71)	154	77.50 (74.91, 80.08)	6.18 (3.43, 8.92)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Figure SSR147 Mean Pre-operative and Post-operative EQ-VAS Health in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis Rotator Cuff Arthropathy)



Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Oxford Score

The Oxford Shoulder Scores (OSS) before and after reverse shoulder replacement undertaken for rotator cuff arthropathy are provided in Table SSR197.

The mean pre-operative and post-operative OSS by gender is shown in Table SSR198 and Figure SSR148 and by age in Table SSR199 and Figure SSR149. Females have lower pre-operative scores and a larger improvement after surgery.

Compared to patients with an ASA 2 score, patients with an ASA score of 3 have a lower pre-operative score and a larger improvement post-operatively (Table SSR200 and Figure SSR150).

Pre-operative mean Oxford score is lower with increasing BMI category. Pre-obese and obese class 1 and 2 patients have similar changes in score post-operatively. Obese class 3 patients have the largest change post-operatively (Table SSR201 and Figure SSR151).

Glenoid morphology does not affect the preoperative OSS although currently there are too few procedures with glenoid morphology C for analysis. The post-operative improvement is similar for all glenoid morphologies (Table SSR202 and Figure SSR152).

Table SSR197 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis Rotator Cuff Arthropathy)

Class	Pre-operative			Post-operative		
	N	Mean (SD)	Median (Q1, Q3)	N	Mean (SD)	Median (Q1, Q3)
Total Stemmed Reverse	1813	23.83(8.94)	24.00 (18.00, 30.00)	1277	37.43(8.71)	40.00 (33.00, 44.00)
TOTAL	**1813**	**23.83(8.94)**	**24.00 (18.00, 30.00)**	**1277**	**37.43(8.71)**	**40.00 (33.00, 44.00)**

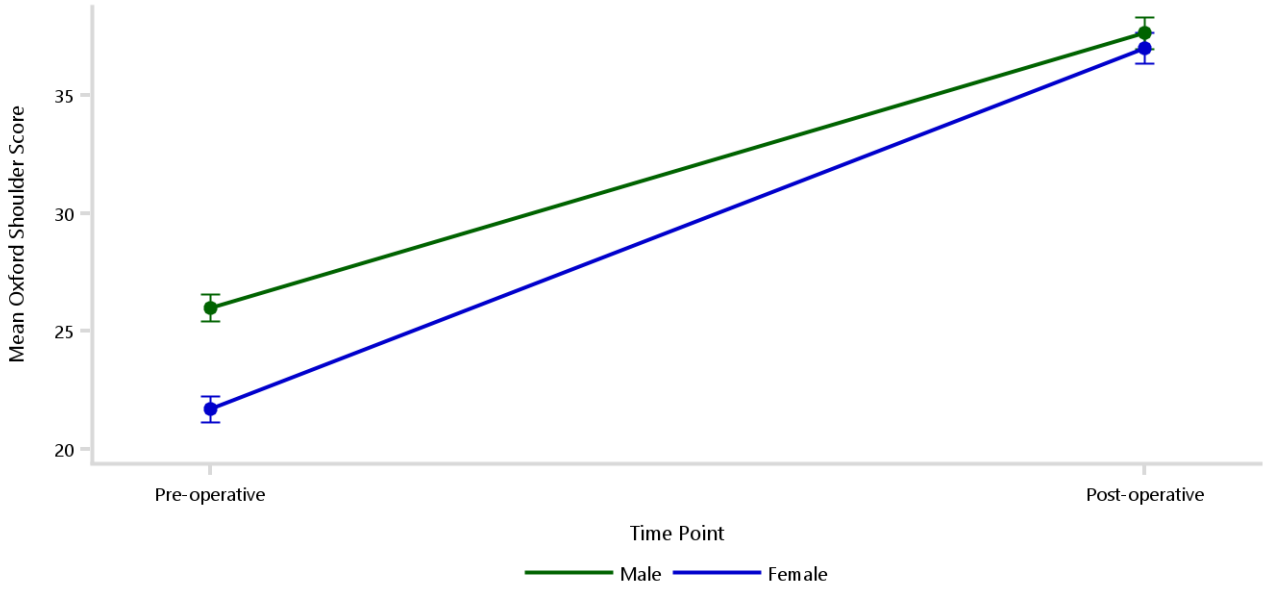
Note: Restricted to modern prostheses

Table SSR198 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)**

Gender	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Male	876	26.01 (25.43, 26.59)	618	37.63 (36.96, 38.30)	11.62 (10.88, 12.36)
Female	937	21.71 (21.15, 22.27)	659	36.98 (36.34, 37.63)	15.27 (14.55, 15.99)

Note: Restricted to modern prostheses
Adjusted for age

Figure SSR148 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)**



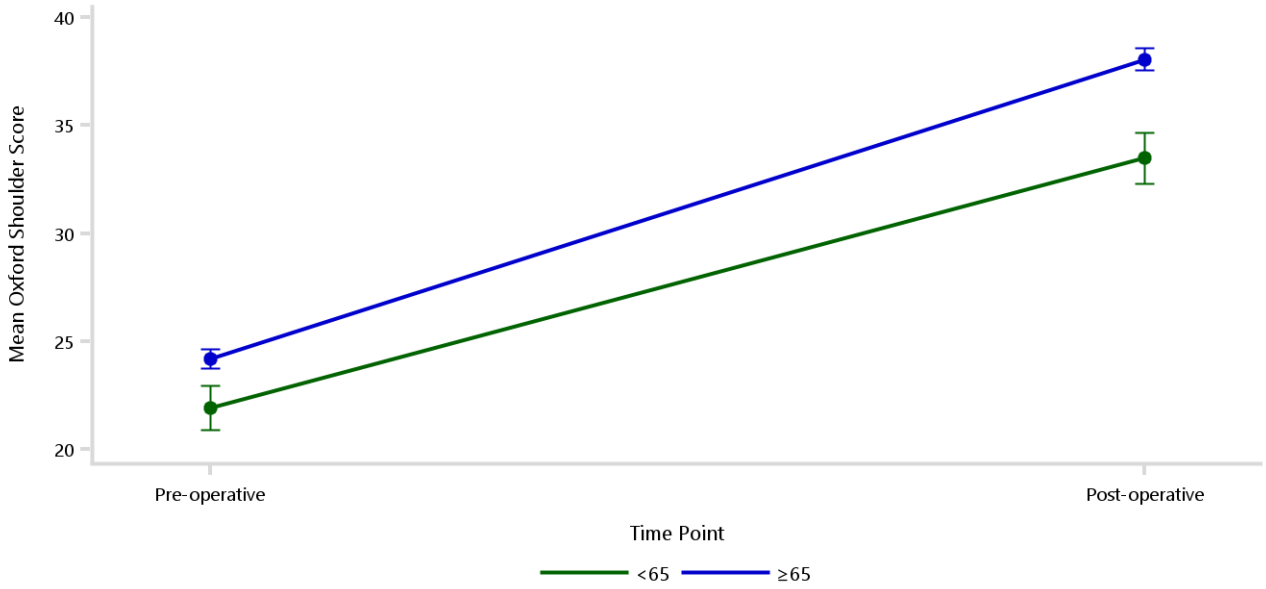
Note: Restricted to modern prostheses
Adjusted for age

Table SSR199 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)**

Age	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
<65	276	21.91 (20.89, 22.93)	198	33.49 (32.31, 34.67)	11.58 (10.25, 12.90)
≥65	1537	24.19 (23.76, 24.62)	1079	38.06 (37.55, 38.56)	13.87 (13.30, 14.44)

Note: Restricted to modern prostheses
Adjusted for gender

Figure SSR149 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)**



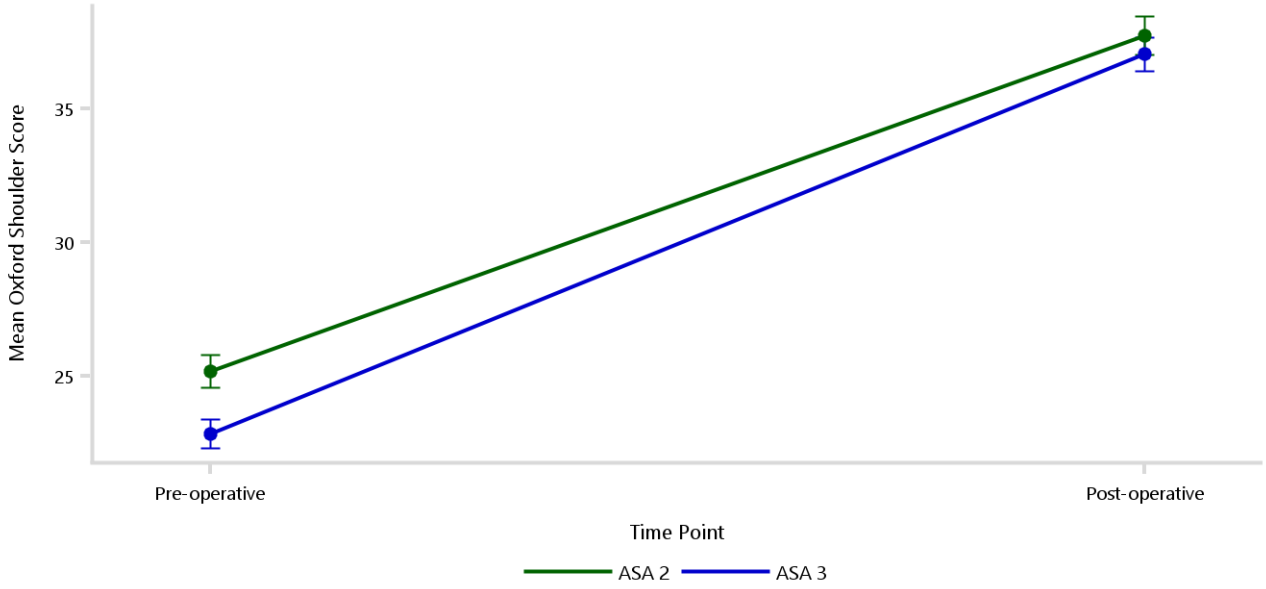
Note: Restricted to modern prostheses
Adjusted for gender

Table SSR200 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis Rotator Cuff Arthropathy)**

ASA Score	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
ASA 2	749	25.19 (24.58, 25.80)	526	37.74 (37.01, 38.47)	12.55 (11.75, 13.36)
ASA 3	969	22.83 (22.29, 23.37)	675	37.05 (36.41, 37.69)	14.22 (13.51, 14.93)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Figure SSR150 **Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by ASA Score (Primary Diagnosis Rotator Cuff Arthropathy)**



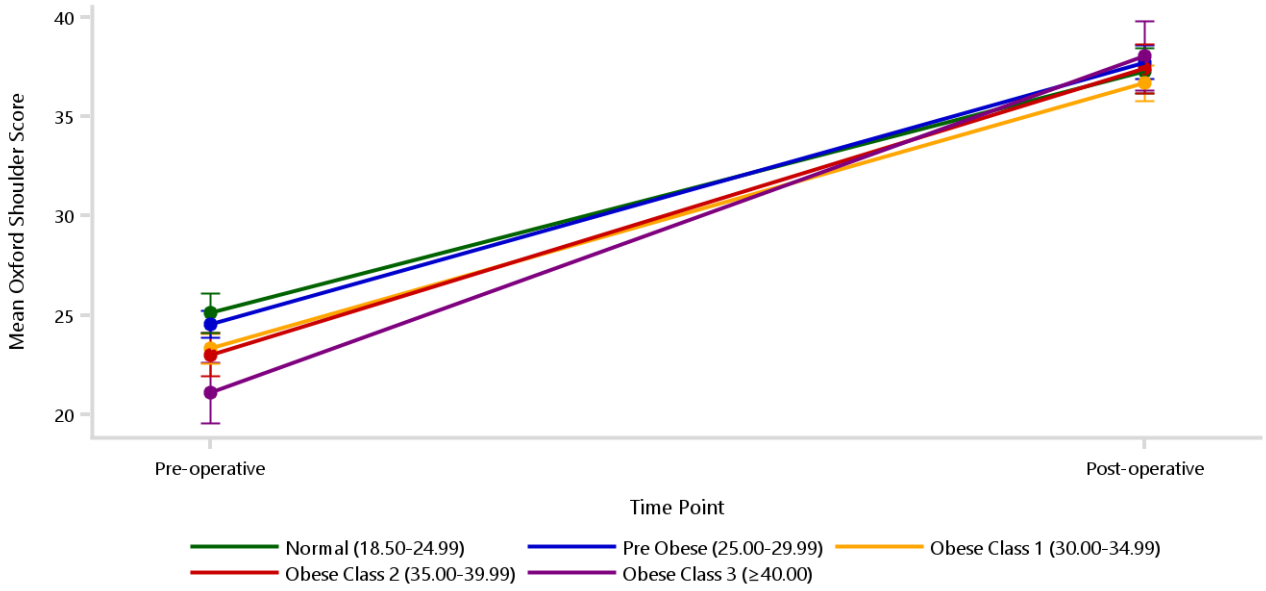
Note: Restricted to modern prostheses
Adjusted for age and gender
Only ASA categories with >40 pre-operative and post-operative responses have been included

Table SSR201 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis Rotator Cuff Arthropathy)

BMI Category	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
Normal (18.50-24.99)	296	25.12 (24.13, 26.10)	215	37.31 (36.17, 38.45)	12.19 (10.92, 13.47)
Pre Obese (25.00-29.99)	615	24.55 (23.86, 25.23)	408	37.75 (36.92, 38.57)	13.20 (12.28, 14.12)
Obese Class 1 (30.00-34.99)	502	23.33 (22.57, 24.08)	353	36.68 (35.79, 37.57)	13.36 (12.36, 14.35)
Obese Class 2 (35.00-39.99)	249	23.01 (21.93, 24.09)	188	37.41 (36.19, 38.64)	14.40 (13.03, 15.77)
Obese Class 3 (≥40.00)	123	21.09 (19.55, 22.63)	94	38.06 (36.31, 39.81)	16.97 (15.02, 18.92)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Figure SSR151 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by BMI Category (Primary Diagnosis Rotator Cuff Arthropathy)



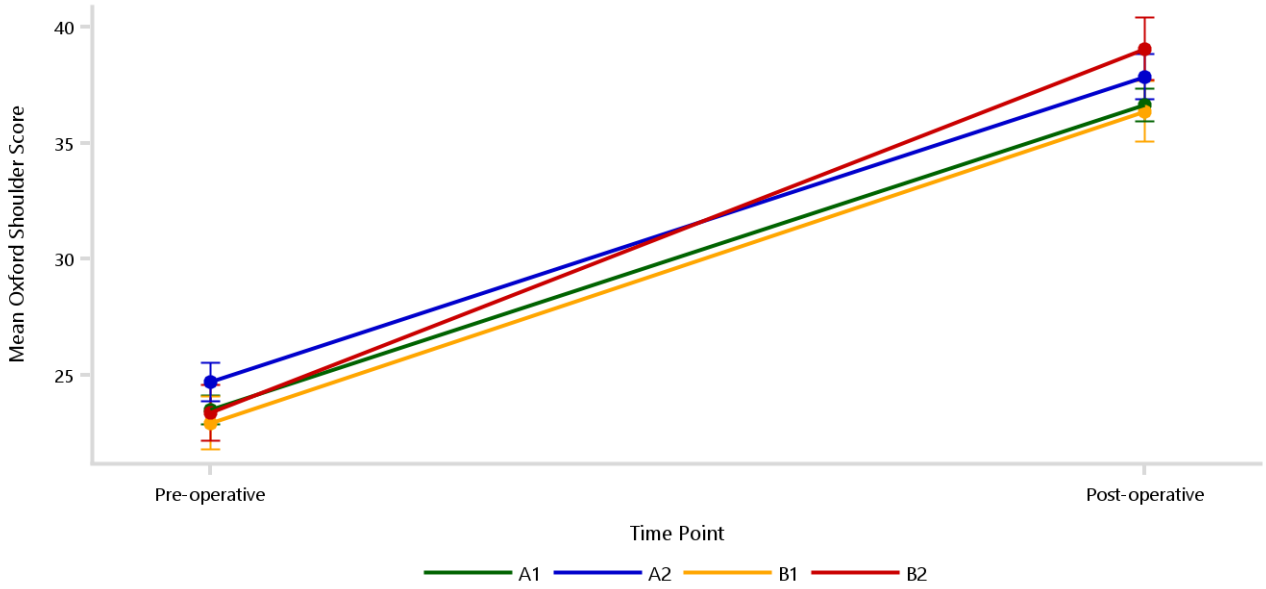
Note: Restricted to modern prostheses
Adjusted for age and gender
Only BMI categories with >40 pre-operative and post-operative responses have been included

Table SSR202 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis Rotator Cuff Arthropathy)

Glenoid Morphology	Pre-operative		Post-operative		Change in Score
	N	Mean (95% CI)	N	Mean (95% CI)	
A1	767	23.54 (22.92, 24.15)	539	36.65 (35.93, 37.36)	13.11 (12.31, 13.91)
A2	424	24.73 (23.90, 25.56)	302	37.86 (36.90, 38.82)	13.13 (12.06, 14.21)
B1	224	22.95 (21.81, 24.09)	161	36.37 (35.06, 37.69)	13.42 (11.95, 14.88)
B2	204	23.39 (22.19, 24.59)	153	39.06 (37.71, 40.41)	15.67 (14.16, 17.18)

Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Figure SSR152 Mean Pre-operative and Post-operative Oxford Shoulder Score in Primary Total Stemmed Reverse Shoulder Replacement by Glenoid Morphology (Primary Diagnosis Rotator Cuff Arthropathy)



Note: Restricted to modern prostheses
Adjusted for age and gender
Only glenoid morphologies with >40 pre-operative and post-operative responses have been included

Patient Satisfaction and Change

Patients were surveyed at 6 months post-operatively on how satisfied they were with their primary total stemmed reverse shoulder replacement for rotator cuff arthropathy, and on their perceived change in their shoulder after surgery.

After this procedure, 85.6% of patients are very satisfied or satisfied (Table SSR203).

Procedure satisfaction by age and gender are presented in Table SSR204, Figure SSR153, Table SSR205 and Figure SSR154.

There was a high percentage (91.6%) of patients who rated their shoulder as much better and a little better (Table SSR206).

Patient-reported change by age and gender are presented in Table SSR207, Figure SSR155, Table SSR208, and Figure SSR156.

Table SSR203 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis Rotator Cuff Arthropathy)

Class	Very Satisfied		Satisfied		Neutral		Dissatisfied		Very Dissatisfied		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Total Stemmed Reverse	725	57.0	364	28.6	122	9.6	41	3.2	21	1.6	1273	100.0

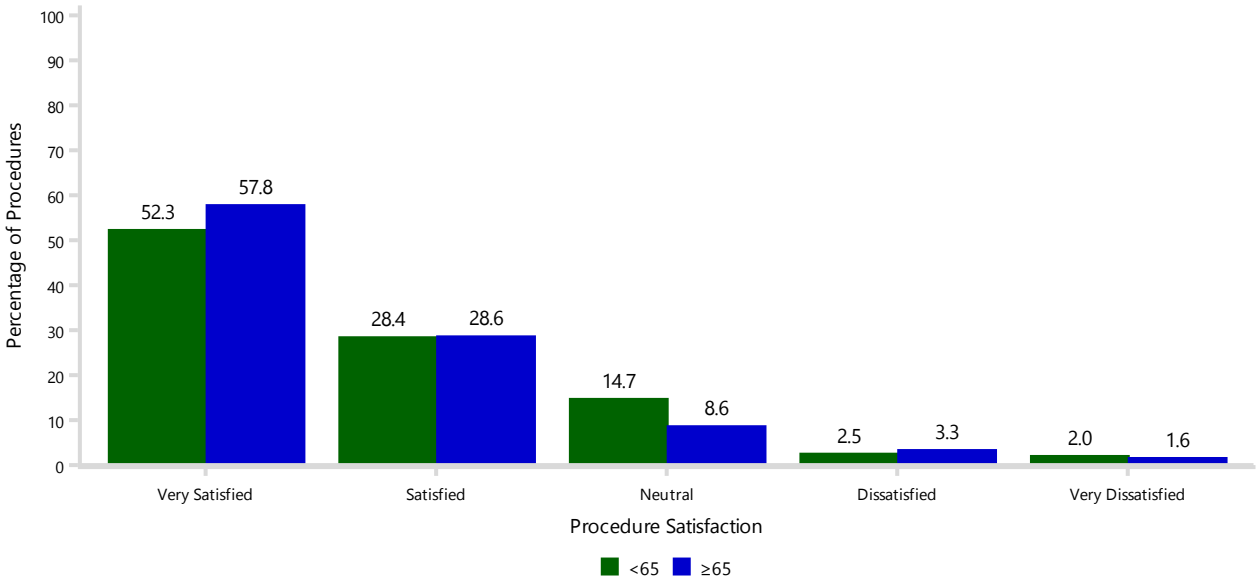
Note: Restricted to modern prostheses

Table SSR204 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)

Age	Very Satisfied			Satisfied			Neutral			Dissatisfied			Very Dissatisfied			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
<65	103	52.3	14.2	56	28.4	15.4	29	14.7	23.8	5	2.5	12.2	4	2.0	19.0	197	100.0	15.5
≥65	622	57.8	85.8	308	28.6	84.6	93	8.6	76.2	36	3.3	87.8	17	1.6	81.0	1076	100.0	84.5
TOTAL	**725**	**57.0**	**100.0**	**364**	**28.6**	**100.0**	**122**	**9.6**	**100.0**	**41**	**3.2**	**100.0**	**21**	**1.6**	**100.0**	**1273**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR153 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)



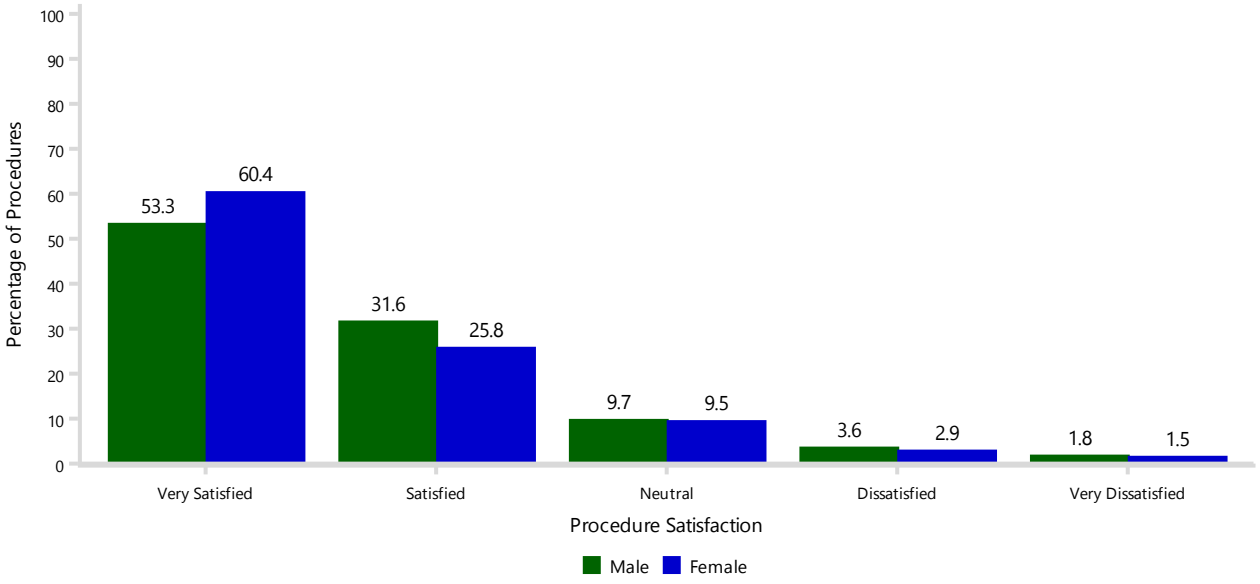
Note: Restricted to modern prostheses

Table SSR205 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)

Gender	Very Satisfied			Satisfied			Neutral			Dissatisfied			Very Dissatisfied			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Male	329	53.3	45.4	195	31.6	53.6	60	9.7	49.2	22	3.6	53.7	11	1.8	52.4	617	100.0	48.5
Female	396	60.4	54.6	169	25.8	46.4	62	9.5	50.8	19	2.9	46.3	10	1.5	47.6	656	100.0	51.5
TOTAL	**725**	**57.0**	**100.0**	**364**	**28.6**	**100.0**	**122**	**9.6**	**100.0**	**41**	**3.2**	**100.0**	**21**	**1.6**	**100.0**	**1273**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR154 Procedure Satisfaction in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)



Note: Restricted to modern prostheses

Table SSR206 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement (Primary Diagnosis Rotator Cuff Arthropathy)

Class	Much Better		A Little Better		About the Same		A Little Worse		Much Worse		TOTAL	
	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%	N	Row%
Total Stemmed Reverse	1002	78.7	164	12.9	62	4.9	31	2.4	14	1.1	1273	100.0

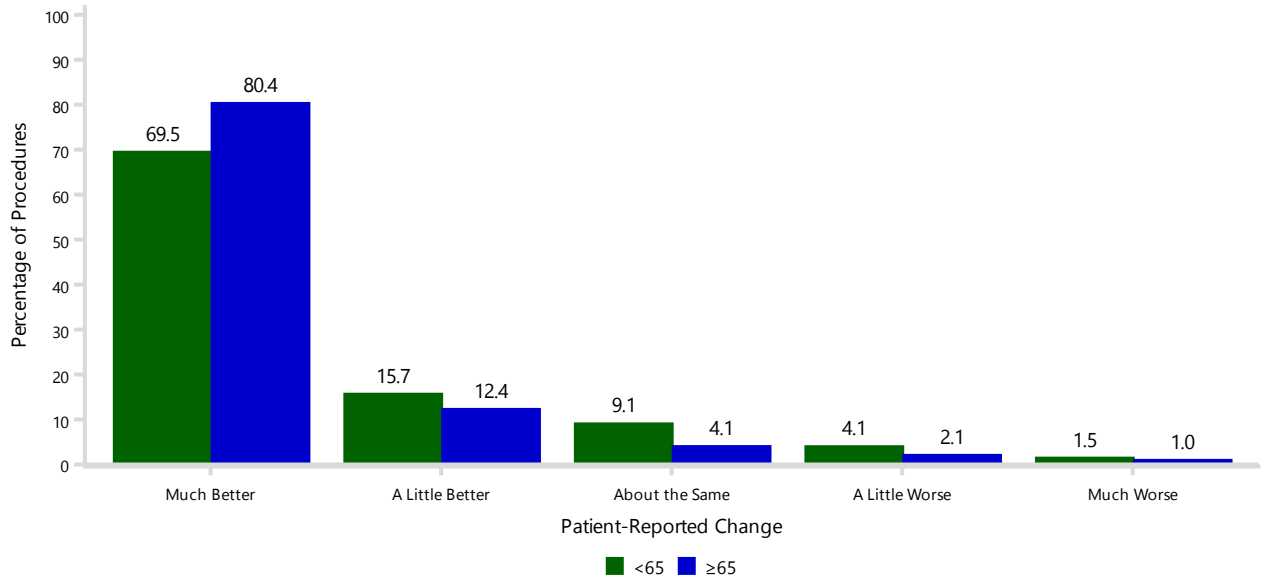
Note: Restricted to modern prostheses

Table SSR207 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)

Age	Much Better			A Little Better			About the Same			A Little Worse			Much Worse			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
<65	137	69.5	13.7	31	15.7	18.9	18	9.1	29.0	8	4.1	25.8	3	1.5	21.4	197	100.0	15.5
≥65	865	80.4	86.3	133	12.4	81.1	44	4.1	71.0	23	2.1	74.2	11	1.0	78.6	1076	100.0	84.5
TOTAL	**1002**	**78.7**	**100.0**	**164**	**12.9**	**100.0**	**62**	**4.9**	**100.0**	**31**	**2.4**	**100.0**	**14**	**1.1**	**100.0**	**1273**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR155 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Age (Primary Diagnosis Rotator Cuff Arthropathy)



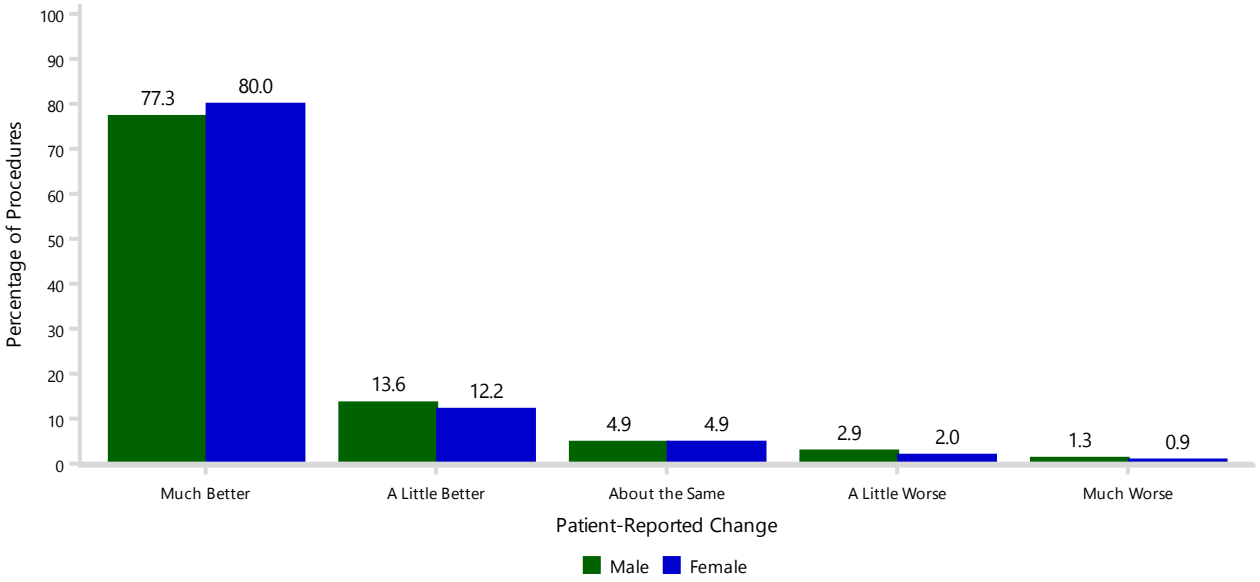
Note: Restricted to modern prostheses

Table SSR208 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)

Gender	Much Better			A Little Better			About the Same			A Little Worse			Much Worse			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Male	477	77.3	47.6	84	13.6	51.2	30	4.9	48.4	18	2.9	58.1	8	1.3	57.1	617	100.0	48.5
Female	525	80.0	52.4	80	12.2	48.8	32	4.9	51.6	13	2.0	41.9	6	0.9	42.9	656	100.0	51.5
TOTAL	**1002**	**78.7**	**100.0**	**164**	**12.9**	**100.0**	**62**	**4.9**	**100.0**	**31**	**2.4**	**100.0**	**14**	**1.1**	**100.0**	**1273**	**100.0**	**100.0**

Note: Restricted to modern prostheses

Figure SSR156 Patient-Reported Change in Primary Total Stemmed Reverse Shoulder Replacement by Gender (Primary Diagnosis Rotator Cuff Arthropathy)



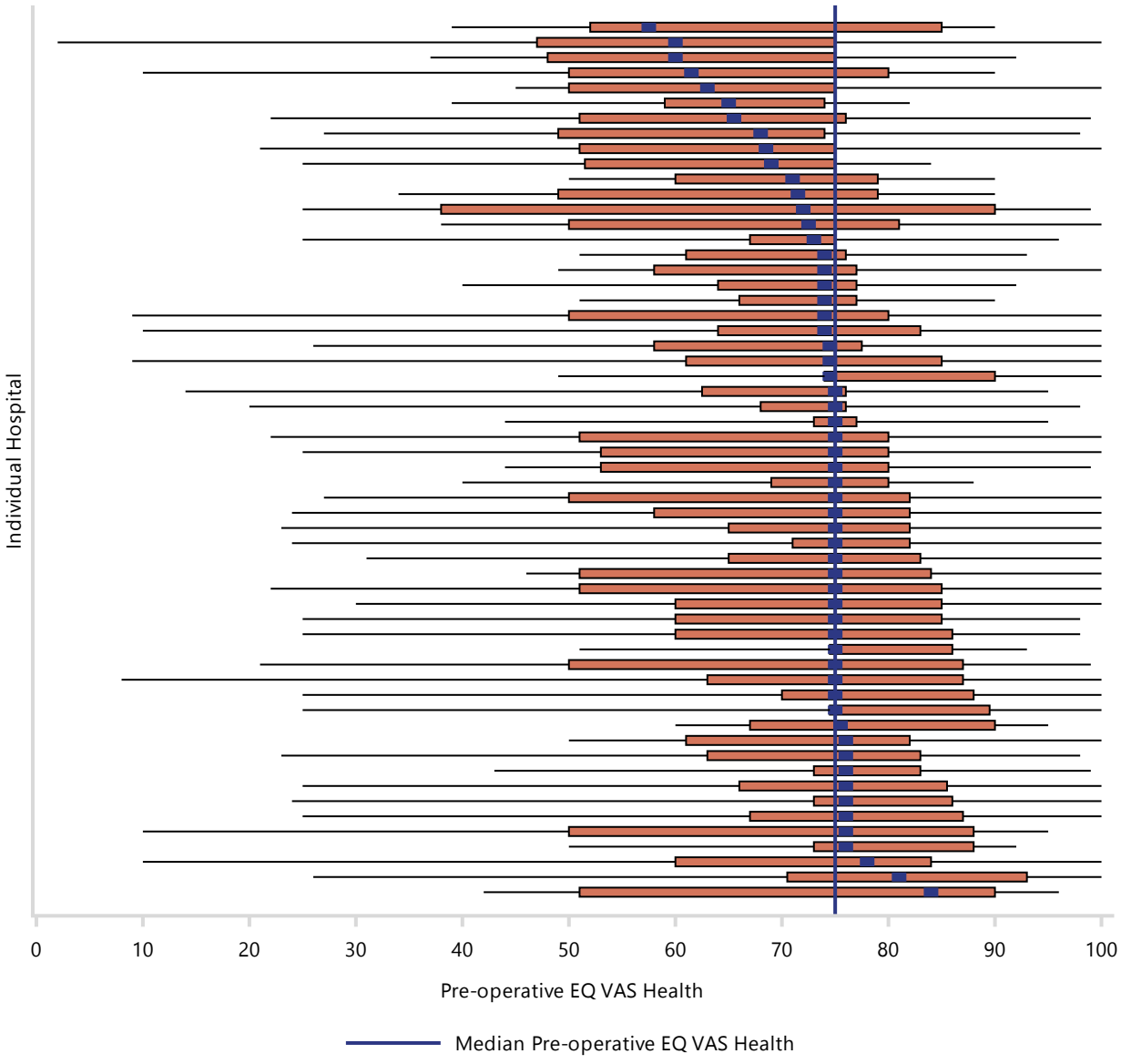
Note: Restricted to modern prostheses

HOSPITAL PROMS

EQ-VAS

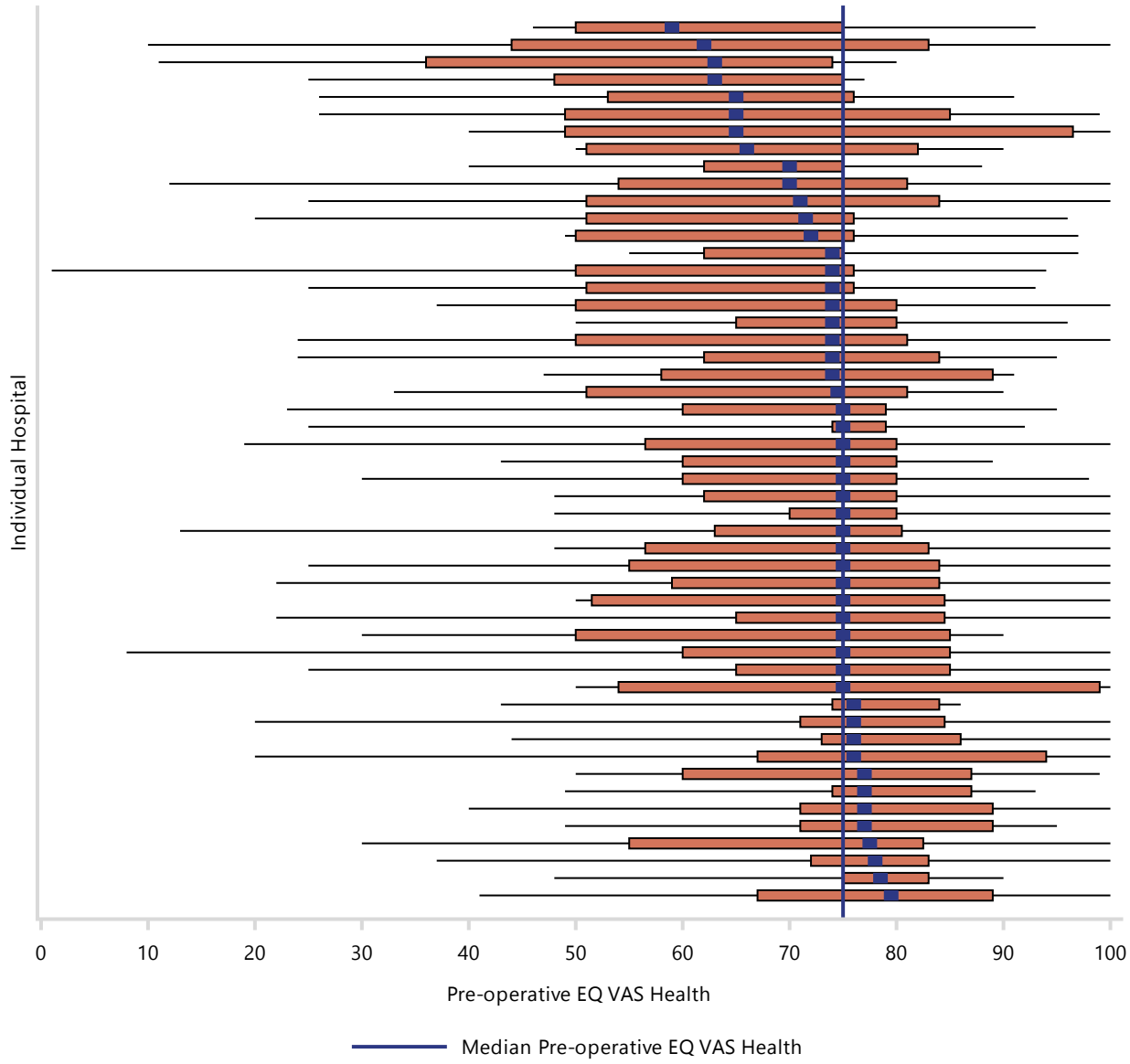
EQ-VAS Variation between hospitals in the EQ-VAS is displayed as 'caterpillar plots' for hospitals with at least 10 recorded cases for total stemmed reverse shoulder replacement for procedures with a primary diagnosis of osteoarthritis are shown in Figure SSR157 and for a primary diagnosis of rotator cuff arthropathy are shown in Figure SSR158. These analyses show pre-operative quality of life assessments for patients of individual hospitals compared to the median value represented by the vertical blue line. The median for each hospital is shown as a blue square, the interquartile range is coloured orange, while the entire range is shown by the grey bars. Most hospitals have an interquartile range that includes the group median value.

Figure SSR157 Pre-Operative EQ-VAS Health in Total Stemmed Reverse Shoulder by Hospital (Primary Diagnosis OA)



Note: The median Pre-operative EQ VAS Health is 75
Only hospitals with at least 10 procedures have been shown
Restricted to modern prostheses

Figure SSR158 Pre-Operative EQ-VAS Health in Total Stemmed Reverse Shoulder by Hospital (Primary Diagnosis Rotator Cuff Arthropathy)

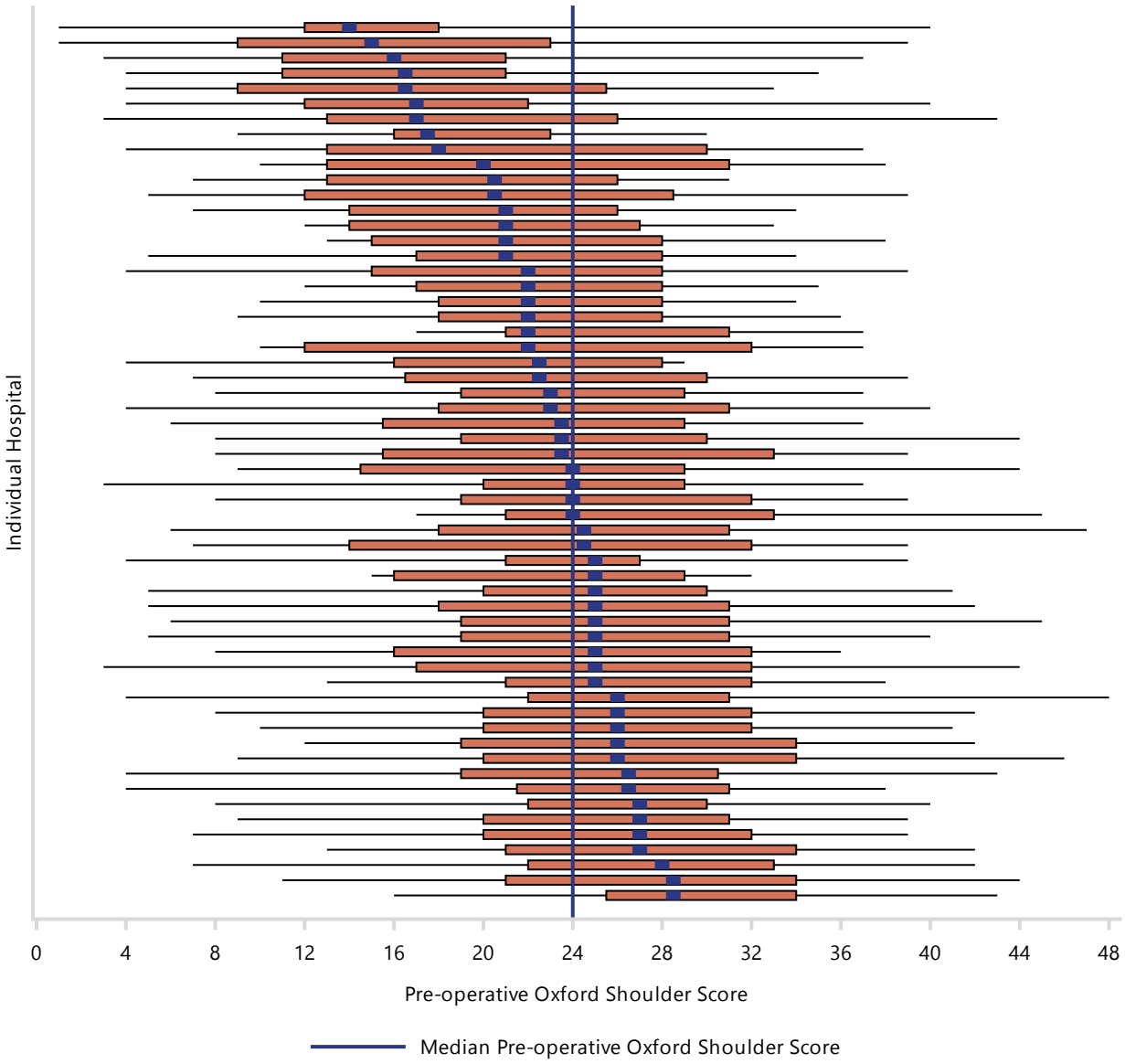


Note: The median Pre-operative EQ VAS Health is 75
Only hospitals with at least 10 procedures have been shown
Restricted to modern prostheses

Oxford Score

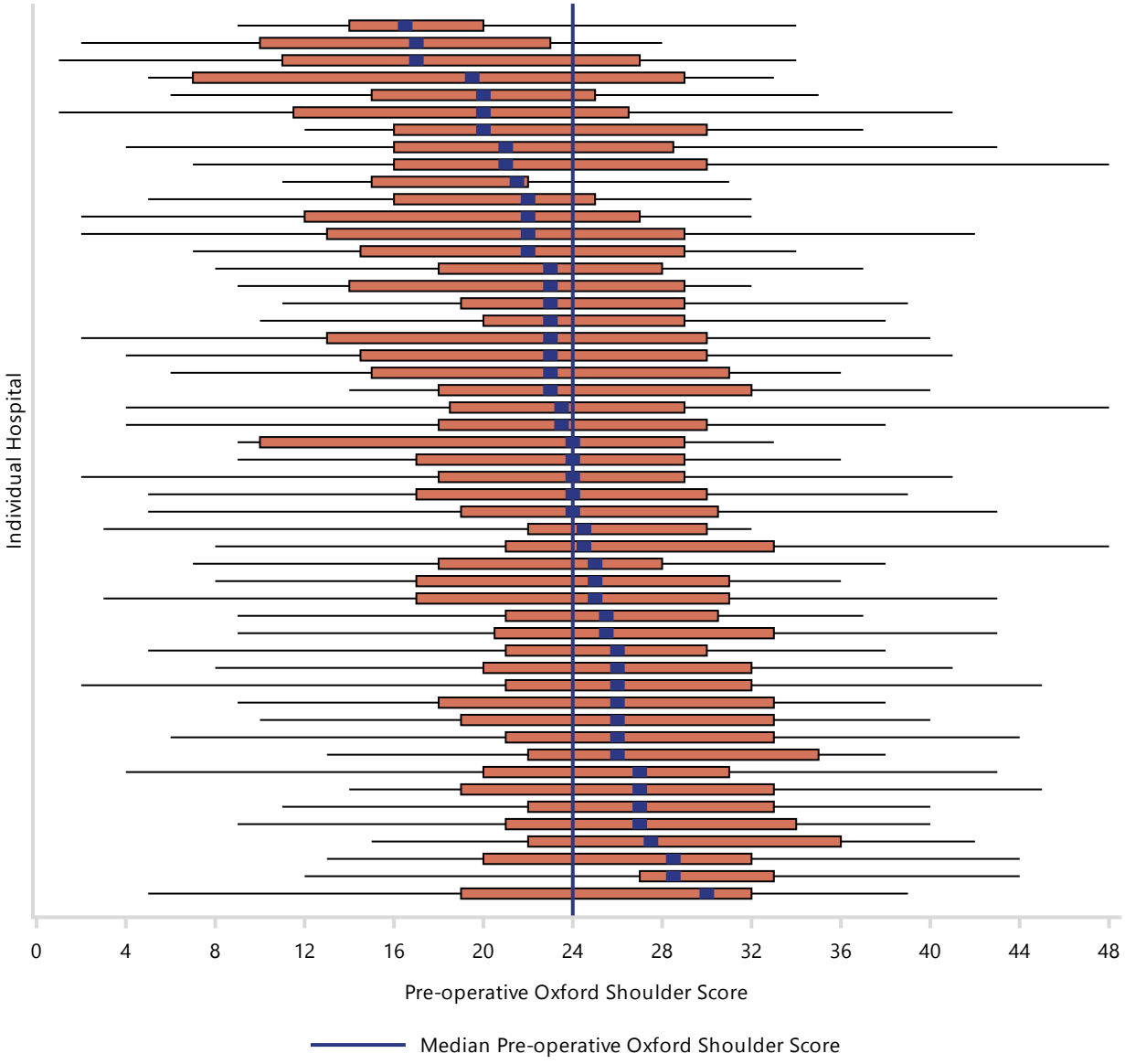
Comparisons of pre-operative Oxford Scores between hospitals for primary stemmed reverse shoulder replacement for procedures with a primary diagnosis of osteoarthritis are shown in Figure SSR159 and for a primary diagnosis of rotator cuff arthropathy are shown in Figure SSR160. These analyses show pre-operative quality of life assessments for patients of individual hospitals compared to the median value represented by the vertical blue line. The median for each hospital is shown as a blue square, the interquartile range is coloured orange, while the entire range is shown by the grey bars. Most hospitals have an interquartile range that includes the group median value

Figure SSR159 Pre-Operative Oxford Shoulder Score in Total Stemmed Reverse Shoulder by Hospital (Primary Diagnosis OA)



Note: The median Pre-operative Oxford Shoulder Score is 2324
Only hospitals with at least 10 procedures have been shown
Restricted to modern prostheses

Figure SSR160 Pre-Operative Oxford Shoulder Score in Total Stemmed Reverse Shoulder by Hospital (Primary Diagnosis Rotator Cuff Arthropathy)



Note: The median Pre-operative Oxford Shoulder Score is 24
Only hospitals with at least 10 procedures have been shown
Restricted to modern prostheses

Benchmarking Total Shoulder Replacement

Ten Year Outcomes

The Registry first reported 10 year outcomes in 2011. Since that time, the Registry has reported on an increasing number of hip and knee prostheses that have achieved this length of follow-up. This outcome is widely regarded as an important milestone in assessing the performance of prostheses.

Since the Registry commenced data collection revision rates have declined and many prostheses are no longer used. In order to keep Registry data contemporaneous, only procedures using prostheses that have been available and used in 2024 (described as modern prostheses) are included in the analyses, unless clearly specified. This approach has been applied both to the calculation of the benchmark standard used to identify superior and non-inferior performance and the selection of prostheses combinations reported. In addition, the Registry has excluded prostheses where a single surgeon performed more than 50% of procedures.

Detailed information on prostheses that are no longer used is available in the supplementary report 'Comparative Prosthesis Performance' on the AOANJRR website: https://aoanjrr.sahmri.com/annual-reports-2025

Primary Shoulder Replacement

The Registry is reporting 10 year outcomes for primary total shoulder replacements. Individual humeral and glenoid prosthesis combinations are reported. A combination is included if >50 procedures have been reported to the Registry and the follow-up is ≥10 years.

As with hips and knees, to ensure that the data reflects contemporary practice only procedures using modern prostheses are included in the analyses. This approach has been applied both to the calculation of the benchmark standard used to identify superior and non-inferior performance and the selection of prosthesis combinations reported. In addition, the Registry has excluded prostheses where a single surgeon performed more than 50% of procedures.

Detailed information on prostheses that are no longer used is available in the supplementary report 'Comparative Prosthesis Performance' on the AOANJRR website: https://aoanjrr.sahmri.com/annual-reports-2025

Primary Total Stemmed Anatomic Shoulder Replacement

There are 5 total stemmed anatomic shoulder replacement combinations with a primary diagnosis of osteoarthritis with 10 year outcomes. These prosthesis combinations were used in 73.7% of all primary total stemmed anatomic shoulder replacement procedures performed for osteoarthritis.

The 10 year cumulative percent revision ranges from 4.9% to 24.2%. The cumulative percent revision benchmark at 10 years, calculated this year is based on the aggregate performance of modern prostheses where cemented polyethylene glenoid components are used for a primary diagnosis of osteoarthritis, which is 7.4%.

Using the benchmark of 7.4% at 10 years, then one total stemmed anatomic shoulder prosthesis combination qualifies for the superiority benchmark.

To assess non-inferiority, the permitted upper confidence interval level is 20% above the new benchmark standard which is 8.9% or less. No additional total stemmed anatomic shoulder prosthesis combination qualify for a non-inferiority benchmark (Table SSR209).

Primary Total Stemmed Reverse Shoulder Replacement

There are 6 total stemmed reverse shoulder replacement combinations undertaken for all diagnoses with 10 year outcomes.

These prosthesis combinations were used in 67.7% of primary total stemmed reverse shoulder replacement procedures performed for any diagnosis reported to the Registry.

The 10 year cumulative percent revision ranges from 3.4% to 6.7%. The cumulative percent revision benchmark at 10 years, calculated this year based on the aggregate performance of modern prostheses with cementless fixation is 5.4%.

Applying a benchmark of 5.4% at 10 years then one total stemmed reverse shoulder prosthesis combination qualifies for the superiority benchmark.

To assess non-inferiority, the permitted upper confidence interval level is 20% above the new benchmark standard which is 6.5% or less. Using this approach, an additional

2 total stemmed reverse shoulder replacement combinations can be benchmarked, i.e. 3 (50%) prosthesis combinations would receive either a superiority or a non-inferiority benchmark. The additional 2 devices with a non-inferiority benchmark are highlighted in blue (Table SSR210).

It is important to emphasise that there are many reasons why a prosthesis combination may not achieve a benchmark standard. These include being used in small numbers, higher revision rates due to factors other than the prostheses used, as well as less satisfactory performance. However, it is clear that those prosthesis combinations that have achieved a benchmark standard have done so because they have revision rates that are comparatively lower.

Table SSR209 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement Combinations with 10 Year Data (Primary Diagnosis OA)

Humeral Component	Glenoid Component	N Revised	N Total	Type of Revision				2 Yrs	5 Yrs	10 Yrs
				TSR	Humeral	Glenoid	Other			
Affinis	Affinis	21	198	7	1	7	6	1.1 (0.3, 4.3)	5.0 (2.7, 9.5)	8.9 (5.4, 14.3)
Ascend Flex	Perform	40	1385	37	1	0	2	1.6 (1.0, 2.4)	2.7 (1.9, 3.9)	4.9 (3.3, 7.0)
Comprehensive	Comprehensive	55	930	41	3	1	10	4.7 (3.5, 6.3)	5.7 (4.3, 7.5)	7.5 (5.6, 10.0)
Equinoxe	Equinoxe	80	726	55	6	4	15	5.1 (3.7, 7.0)	9.6 (7.4, 12.3)	24.2 (18.1, 32.0)
SMR	SMR	36	533	29	1	1	5	4.5 (3.0, 6.7)	5.6 (3.9, 8.0)	7.0 (5.0, 9.7)
TOTAL		**232**	**3772**	**169**	**12**	**13**	**38**			

Note: Only prostheses with >50 procedures have been listed.
Green: prosthesis combination qualifies for a superiority benchmark.
Blue: prosthesis combination qualifies for non-inferiority benchmark.
Restricted to modern prostheses.

Table SSR210 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement Combinations with 10 Year Data (All Diagnoses)

Humeral Component	Glenoid Component	N Revised	N Total	Type of Revision				2 Yrs	5 Yrs	10 Yrs
				TSR	Humeral	Glenoid	Other			
Aequalis	Aequalis	219	4555	13	38	17	151	2.9 (2.4, 3.4)	4.4 (3.8, 5.1)	6.7 (5.8, 7.7)
Ascend Flex	Aequalis	157	4084	33	94	2	28	3.4 (2.9, 4.1)	4.9 (4.2, 5.8)	5.7 (4.6, 7.2)
Comprehensive	Comprehensive Reverse	159	8747	62	66	4	27	1.8 (1.5, 2.1)	2.5 (2.1, 3.0)	3.4 (2.2, 5.2)
Delta Xtend	Delta Xtend	490	12331	28	72	29	361	2.8 (2.5, 3.1)	3.7 (3.4, 4.1)	5.0 (4.5, 5.5)
SMR	SMR L1	504	11869	36	110	40	318	3.6 (3.3, 4.0)	4.3 (3.9, 4.7)	5.3 (4.8, 5.8)
Trabecular Metal	Trabecular Metal	105	1988	2	8	35	60	3.5 (2.8, 4.5)	5.1 (4.2, 6.3)	6.4 (5.2, 7.9)
TOTAL		**1634**	**43574**	**174**	**388**	**127**	**945**			

Note: Only prostheses with >50 procedures have been listed.
Green: prosthesis combination qualifies for a superiority benchmark.
Blue: prosthesis combination qualifies for non-inferiority benchmark.
Restricted to modern prostheses.

Comparative Assessment of Shoulder Replacement

The purpose of this chapter is to ensure that the Registry provides updated 10 data on the comparative performance of all prostheses including those that are no longer used. This contrasts with the Annual Report Chapter "Ten, Fifteen, and Twenty Year Prosthesis Outcomes" which exclusively analyses modern prostheses only (i.e. prostheses that are still available and still used in 2024).

Surgeons at the Annual Report Workshop highlighted that there was ongoing interest in the comparative performance of all devices reported to the Registry and recommended its inclusion as a supplementary report. This supplementary report provides a historical perspective of prosthesis performance.

The Registry is reporting 10 year outcomes for primary total shoulder replacements. Individual humeral and glenoid prosthesis combinations are reported. A combination is included if >50 procedures have been reported to the Registry and the follow-up is ≥10 years. Those prostheses not used in 2024 are identified with an asterisk in each of the tables.

Primary Total Stemmed Anatomic Shoulder Replacement

There are 16 total stemmed anatomic shoulder prosthesis combinations that have been used in >50 procedures and have data to at least 10 years. The listed combinations were used in 88.8% of all primary total stemmed anatomic shoulder replacement procedures performed for osteoarthritis. The 10 year cumulative percent revision ranges from 3.9% to 39.1% (Table SSR211).

Primary Total Stemmed Reverse Shoulder Replacement

There are 9 total reverse shoulder prosthesis combinations that have been used in >50 procedures and have data to at least 10 years. The listed combinations were used in 71.2% of all primary total reverse shoulder replacement procedures performed for any diagnosis. The 10 year cumulative percent revision ranges from 3.4% to 10.0% (Table SSR212).

Table SSR211 Cumulative Percent Revision of Primary Total Stemmed Anatomic Shoulder Replacement Combinations with 10 Year Data (Primary Diagnosis OA)

Humeral Component	Glenoid Component	N Revised	N Total	Type of Revision				2 Yrs	5 Yrs	10 Yrs
				TSR	Humeral	Glenoid	Other			
Aequalis	Aequalis*	108	1563	65	7	9	27	2.3 (1.6, 3.1)	3.4 (2.6, 4.4)	5.9 (4.8, 7.3)
Aequalis	Perform*	7	125	3	1	1	2	4.0 (1.7, 9.4)	5.7 (2.7, 11.5)	5.7 (2.7, 11.5)
Affinis	Affinis	21	198	7	1	7	6	1.1 (0.3, 4.3)	5.0 (2.7, 9.5)	8.9 (5.4, 14.3)
Ascend	Aequalis*	18	236	14	1	1	2	3.0 (1.4, 6.2)	5.6 (3.3, 9.5)	9.0 (5.5, 14.7)
Ascend	Perform*	7	107	5	0	0	2	1.9 (0.5, 7.4)	3.9 (1.5, 10.0)	3.9 (1.5, 10.0)
Ascend Flex	Perform	41	1388	38	1	0	2	1.7 (1.1, 2.5)	2.8 (2.0, 4.0)	4.9 (3.4, 7.1)
Bigliani/Flatow	Bigliani/Flatow*	15	142	8	3	2	2	2.1 (0.7, 6.4)	3.6 (1.5, 8.3)	8.9 (5.0, 15.6)
Bigliani/Flatow TM	Bigliani/Flatow TM*	47	643	23	3	3	18	3.8 (2.5, 5.6)	5.0 (3.6, 7.1)	7.1 (5.3, 9.5)
Bigliani/Flatow TM	Bigliani/Flatow*	39	453	26	1	4	8	3.6 (2.2, 5.7)	5.4 (3.6, 7.9)	8.4 (6.1, 11.7)
Comprehensive	Comprehensive	56	931	41	4	1	10	4.8 (3.6, 6.4)	5.8 (4.4, 7.6)	7.6 (5.7, 10.1)
Equinoxe	Equinoxe	80	726	55	6	4	15	5.1 (3.7, 7.0)	9.6 (7.4, 12.3)	24.2 (18.1, 32.0)
Global AP	Global*	159	2969	92	16	9	42	2.3 (1.9, 3.0)	3.3 (2.7, 4.1)	5.3 (4.5, 6.2)
Global Advantage	Global*	56	725	27	6	10	13	2.4 (1.5, 3.8)	3.8 (2.6, 5.5)	6.7 (5.0, 9.0)
SMR	SMR	36	534	29	1	1	5	4.5 (3.0, 6.7)	5.6 (3.9, 8.0)	6.9 (5.0, 9.7)
SMR	SMR L1*	442	2280	11	412	1	18	8.9 (7.8, 10.1)	13.3 (11.9, 14.7)	20.3 (18.5, 22.2)
SMR	SMR L2*	308	798	6	256	7	39	17.5 (15.0, 20.3)	30.3 (27.2, 33.7)	39.1 (35.7, 42.7)
TOTAL		**1440**	**13818**	**450**	**719**	**60**	**211**			

Note: Only prostheses with >50 procedures have been listed

* Denotes prosthesis combinations that have not had any reported use in primary total stemmed anatomic shoulder procedures in 2024

Table SSR212 Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement Combinations with 10 Year Data (All Diagnoses)

Humeral Component	Glenoid Component	N Revised	N Total	Type of Revision				2 Yrs	5 Yrs	10 Yrs
				TSR	Humeral	Glenoid	Other			
Aequalis	Aequalis	219	4556	13	38	17	151	2.9 (2.4, 3.4)	4.4 (3.8, 5.1)	6.7 (5.8, 7.7)
Ascend Flex	Aequalis	157	4084	33	94	2	28	3.4 (2.9, 4.1)	4.9 (4.2, 5.8)	5.7 (4.6, 7.2)
Comprehensive	Comprehensive Reverse	159	8753	62	66	4	27	1.8 (1.5, 2.1)	2.5 (2.1, 3.0)	3.4 (2.2, 5.2)
Delta CTA	Delta CTA*	11	89	1	0	3	7	5.7 (2.4, 13.1)	6.9 (3.1, 14.6)	10.0 (5.1, 19.1)
Delta Xtend	Delta Xtend	490	12335	28	72	29	361	2.8 (2.5, 3.1)	3.7 (3.4, 4.1)	5.0 (4.5, 5.5)
RSP	RSP	115	2329	9	27	8	71	3.6 (2.9, 4.5)	5.2 (4.3, 6.3)	5.8 (4.7, 7.1)
SMR	SMR L1	505	11877	36	111	40	318	3.6 (3.3, 4.0)	4.3 (3.9, 4.7)	5.3 (4.8, 5.8)
SMR	SMR L2*	75	1141	2	17	2	54	4.3 (3.2, 5.6)	5.5 (4.3, 7.1)	7.2 (5.7, 8.9)
Trabecular Metal	Trabecular Metal	105	1989	2	8	35	60	3.5 (2.8, 4.5)	5.1 (4.2, 6.3)	6.4 (5.2, 7.9)
TOTAL		**1836**	**47153**	**186**	**433**	**140**	**1077**			

Note: Only prostheses with >50 procedures have been listed

* Denotes prosthesis combinations that have not had any reported use in primary total stemmed reverse shoulder procedures in 2024

Revision Shoulder Arthroplasty

Introduction

This year, the Registry is providing a comprehensive analysis of the outcome of revision shoulder replacement surgery. The aim of this chapter is to expand on the previous methodology on revision arthroplasty, from 2015 and 2020 for the analyses of revision shoulder surgery. Information is provided on revisions for specific reasons, and the outcomes of major total, partial and minor revisions. The Registry also examines mortality after the 1st revision.

A revision is defined as a re-operation of a previous joint replacement where one or more of the prosthetic components are replaced, removed, or one or more components are added. To fully understand the outcome of an initial revision procedure, it is necessary to know the details of the primary procedure. Without this information, it is not apparent if the revision is the 1st revision or a subsequent revision. The Registry has a linking process, which is run monthly and automatically links a primary procedure to any subsequent revisions on the same side. The key to determining the order of revisions is knowledge of the primary procedure.

TERMINOLOGY

Reporting the outcome of revision procedures has the potential to be confusing. This is in part related to a lack of agreed terminology.

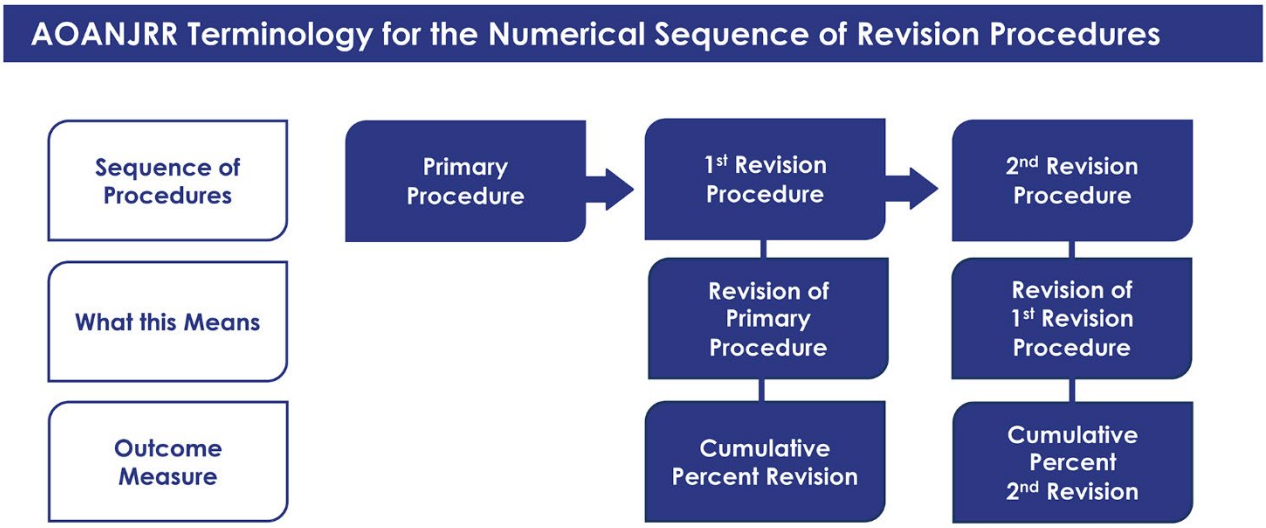
Using definitions from the 2020 Annual Report, the Registry has endeavoured to standardise the sequence of revisions and uses a numerical approach to describe revision procedures.

The 1st revision is the revision of a primary procedure. The 2nd revision is the revision of the 1st revision, and so on. Non-specific terminology such as 're-revision' has been avoided. This numerical sequence becomes increasingly important as registries have longer follow-up of known primary procedures that have multiple revisions.

When reporting the cumulative percent revision, the specific numerical terminology is used to correctly report the revision sequence. We have defined the term cumulative percent 2nd revision as the percent of 1st revision procedures revised up until time allowing for right censoring due to death and 'closure' of the database at the time of the analysis.

APPROACH TO ANALYSIS

The analyses for all primary diagnoses are included for the analyses for shoulder replacement revisions. Due to the complexities involved in the analysis of revisions for sepsis, 1st revision procedures undertaken for infection have been excluded from all analyses. However, 2nd revisions for infection are reported. The 2023 Annual Report provided a more comprehensive analysis of the outcomes of revision for infection.



1st Revision Shoulder Replacement

The Registry has information on 5,347 1st revision shoulder replacement procedures for all primary diagnoses. There were 848 procedures excluded where the 1st revision was undertaken for infection.

There are also 27 1st revision procedures excluded where minor or major prostheses were not inserted, and the diagnosis was not infection.

All shoulder replacement classes other than partial resurfacing anatomic were revised predominately to total stemmed reverse at the 1st revision.

A hemi stemmed anatomic is amongst the most widely undertaken primary shoulder replacements, and this procedure is revised to a total stemmed reverse at the 1st revision in 94.8% of cases. Similarly, a total stemless anatomic is revised to a total stemmed reverse in 89.7% of cases, a total stemmed anatomic in 89.4% and a total stemmed reverse in 87.2% of cases, respectively. The primary diagnosis of 1st revision shoulder replacement classes is summarised in Table SSR213. Due to the number of 1st revisions available, the following analyses are limited to 1st revisions of primary total stemmed anatomic and total stemmed reverse shoulder replacements.

Table SSR213 1st Revision of Primary Shoulder Replacement by Primary Diagnosis and Type of Primary

Primary Diagnosis	Partial Resurfacing Anatomic			Hemi Resurfacing Anatomic			Hemi Stemmed Anatomic			Hemi Stemless Anatomic			Humeral Ball		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Fracture	.	.	.	2	0.3	0.7	325	48.6	60.3	1	0.1	6.3	.	.	.
Instability	2	3.3	11.1	2	3.3	0.7	5	8.3	0.9	.	.	.	.	.	.
Osteoarthritis	15	0.5	83.3	231	8.4	85.2	139	5.1	25.8	10	0.4	62.5	2	0.1	100.0
Osteonecrosis	.	.	.	5	6.0	1.8	19	22.6	3.5	3	3.6	18.8	.	.	.
Other Inflammatory Arthritis	.	.	.	1	3.8	0.4	5	19.2	0.9	.	.	.	.	.	.
Rheumatoid Arthritis	.	.	.	4	5.1	1.5	7	9.0	1.3	.	.	.	.	.	.
Rotator Cuff Arthropathy	1	0.1	5.6	26	3.4	9.6	20	2.6	3.7	2	0.3	12.5	.	.	.
Tumour	.	.	.	.	.	.	19	38.8	3.5	.	.	.	.	.	.
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
TOTAL	**18**	**0.4**	**100.0**	**271**	**6.1**	**100.0**	**539**	**12.1**	**100.0**	**16**	**0.4**	**100.0**	**2**	**0.0**	**100.0**

Primary Diagnosis	Total Resurfacing Anatomic			Total Stemmed Anatomic			Total Stemless Anatomic		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Fracture	1	0.1	4.0	19	2.8	1.2	1	0.1	0.6
Instability	.	.	.	13	21.7	0.8	1	1.7	0.6
Osteoarthritis	23	0.8	92.0	1469	53.7	92.9	158	5.8	94.6
Osteonecrosis	.	.	.	33	39.3	2.1	5	6.0	3.0
Other Inflammatory Arthritis	1	3.8	4.0	11	42.3	0.7	1	3.8	0.6
Rheumatoid Arthritis	.	.	.	22	28.2	1.4	.	.	.
Rotator Cuff Arthropathy	.	.	.	13	1.7	0.8	1	0.1	0.6
Tumour	.	.	.	.	.	.	.	.	.
Other	.	.	.	1	50.0	0.1	.	.	.
TOTAL	**25**	**0.6**	**100.0**	**1581**	**35.4**	**100.0**	**167**	**3.7**	**100.0**

Primary Diagnosis	Total Stemmed Reverse			Total Stemless Reverse			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Fracture	320	47.8	17.3	.	.	.	669	100.0	15.0
Instability	37	61.7	2.0	.	.	.	60	100.0	1.3
Osteoarthritis	689	25.2	37.2	2	0.1	100.0	2738	100.0	61.2
Osteonecrosis	19	22.6	1.0	.	.	.	84	100.0	1.9
Other Inflammatory Arthritis	7	26.9	0.4	.	.	.	26	100.0	0.6
Rheumatoid Arthritis	45	57.7	2.4	.	.	.	78	100.0	1.7
Rotator Cuff Arthropathy	703	91.8	38.0	.	.	.	766	100.0	17.1
Tumour	30	61.2	1.6	.	.	.	49	100.0	1.1
Other	1	50.0	0.1	.	.	.	2	100.0	0.0
TOTAL	**1851**	**41.4**	**100.0**	**2**	**0.0**	**100.0**	**4472**	**100.0**	**100.0**

1st Revision of Total Stemmed Anatomic Shoulder Replacement

The Registry has information on 1,705 1st revisions of total stemmed anatomic shoulder replacement procedures for all primary diagnoses. There are 119 procedures excluded where the 1st revision was undertaken for infection.

There are also 5 procedures excluded where minor or major prostheses were not inserted, and the diagnosis was not infection. Therefore, this analysis includes 1581 1st revisions of total stemmed anatomic replacements.

DEMOGRAPHICS OF 1ST REVISION

The mean age at 1st revision is 70.1 years. 1st revision of total stemmed anatomic is more common in females (58.4%) except for implant breakage of the glenoid insert (45.1%). The highest proportion of patients have an ASA score of 3 (50.9%) or 2 (44.0%) and are pre obese (31.3%) or have a BMI in the obese class 1 category (29.2%). Demographic details for revision of total stemmed anatomic shoulder replacement procedures are shown in Table SSR214.

Table SSR214 Summary of 1st Revision of Known Primary Total Stemmed Anatomic Replacement (All Diagnoses, Excluding 1st Revisions for Infection)

Variable	Rotator Cuff Insufficiency (n=426)	Instability/ Dislocation (n=367)	Loosening (n=365)	Implant Breakage Glenoid Insert (n=102)	Other (n=321)	TOTAL (n=1,581)
Follow-up Years (Primary to 1st Revision)						
Mean (SD)	3.5 ± 3.5	2.4 ± 3.1	5.8 ± 4.2	4.4 ± 3.4	4.2 ± 3.8	4 ± 3.8
Median (IQR)	2 (0.9, 5.8)	1 (0.4, 3.1)	5.4 (2, 8.7)	3.7 (1.8, 6.3)	2.8 (1, 6.6)	2.4 (0.9, 6.5)
Minimum	0	0	0	0.2	0	0
Maximum	16	15.6	16.9	15.1	17.7	17.7
Age at 1st Revision						
Mean (SD)	70.8 ± 8.8	69 ± 9.9	70.9 ± 8.2	71 ± 8.7	69.1 ± 9.5	70.1 ± 9.1
Median (IQR)	71 (66, 77)	70 (64, 76)	72 (66, 77)	71.5 (66, 77)	70 (64, 76)	71 (65, 76)
Age at 1st Revision in groups						
<55	18 (4.2%)	28 (7.6%)	12 (3.3%)	4 (3.9%)	21 (6.5%)	83 (5.2%)
55-64	72 (16.9%)	73 (19.9%)	65 (17.8%)	16 (15.7%)	67 (20.9%)	293 (18.5%)
65-74	188 (44.1%)	151 (41.1%)	160 (43.8%)	48 (47.1%)	136 (42.4%)	683 (43.2%)
≥75	148 (34.7%)	115 (31.3%)	128 (35.1%)	34 (33.3%)	97 (30.2%)	522 (33%)
Gender						
Male	151 (35.4%)	119 (32.4%)	167 (45.8%)	56 (54.9%)	164 (51.1%)	657 (41.6%)
Female	275 (64.6%)	248 (67.6%)	198 (54.2%)	46 (45.1%)	157 (48.9%)	924 (58.4%)
ASA at 1st Revision[1]						
ASA 1	6 (1.8%)	9 (3.5%)	9 (3%)		13 (5.3%)	37 (3.1%)
ASA 2	144 (43%)	103 (40.6%)	134 (44.2%)	33 (52.4%)	113 (46.3%)	527 (44%)
ASA 3	175 (52.2%)	139 (54.7%)	157 (51.8%)	29 (46%)	110 (45.1%)	610 (50.9%)
ASA 4	10 (3%)	3 (1.2%)	3 (1%)	1 (1.6%)	8 (3.3%)	25 (2.1%)
BMI at 1st Revision[2]						
Underweight	3 (1.1%)		2 (0.8%)		1 (0.5%)	6 (0.6%)
Normal	35 (12.4%)	41 (20.6%)	50 (19.4%)	7 (16.3%)	24 (13%)	157 (16.2%)
Pre Obese	93 (32.9%)	59 (29.6%)	74 (28.7%)	17 (39.5%)	60 (32.4%)	303 (31.3%)
Obese Class 1	76 (26.9%)	54 (27.1%)	83 (32.2%)	9 (20.9%)	61 (33%)	283 (29.2%)

Variable	Rotator Cuff Insufficiency (n=426)	Instability/ Dislocation (n=367)	Loosening (n=365)	Implant Breakage Glenoid Insert (n=102)	Other (n=321)	TOTAL (n=1,581)
Obese Class 2	50 (17.7%)	27 (13.6%)	34 (13.2%)	7 (16.3%)	23 (12.4%)	141 (14.6%)
Obese Class 3	26 (9.2%)	18 (9%)	15 (5.8%)	3 (7%)	16 (8.6%)	78 (8.1%)
Fixation of Primary Procedure						
Cemented	11 (2.6%)	24 (6.5%)	39 (10.7%)	1 (1%)	8 (2.5%)	83 (5.2%)
Cementless	276 (64.8%)	220 (59.9%)	69 (18.9%)	98 (96.1%)	196 (61.1%)	859 (54.3%)
Hybrid	139 (32.6%)	123 (33.5%)	257 (70.4%)	3 (2.9%)	117 (36.4%)	639 (40.4%)
Glenoid Fixation in 1st Revision						
Glenoid Cemented	3 (0.7%)	11 (3%)	47 (12.9%)	2 (2%)	14 (4.4%)	77 (4.9%)
Glenoid Cementless	142 (33.3%)	120 (32.7%)	214 (58.6%)	7 (6.9%)	65 (20.2%)	548 (34.7%)
No Glenoid inserted in 1st Revision	281 (66%)	236 (64.3%)	104 (28.5%)	93 (91.2%)	242 (75.4%)	956 (60.5%)
Humeral Fixation in 1st Revision						
Humeral Cemented	38 (8.9%)	35 (9.5%)	91 (24.9%)		33 (10.3%)	197 (12.5%)
Humeral Cementless	376 (88.3%)	282 (76.8%)	171 (46.8%)	83 (81.4%)	209 (65.1%)	1,121 (70.9%)
No Humeral component inserted in 1st Revision	12 (2.8%)	50 (13.6%)	103 (28.2%)	19 (18.6%)	79 (24.6%)	263 (16.6%)

Abbreviations: SD - standard deviation, IQR - interquartile range, ASA - American Society of Anesthesiologists, BMI - Body Mass Index (kg/m^2).

[1]Excludes 382 procedures with unknown ASA at 1st Revision.

[2]Excludes 613 procedures with unknown BMI at 1st Revision

BMI are not provided for patients aged ≤19 years.

OUTCOME OF 1ST REVISION

There are 259 revisions of the 1,581 1st revision procedures. The cumulative percent 2nd revision at 10 years is 19.9% and at 14 years is 20.5% (Table SSR215 and Figure SSR161).

The most common reasons for 2nd revision are instability/dislocation (31.7%), loosening (24.7%), infection (13.1%) and rotator cuff insufficiency (7.7%) (Table SSR216 and Figure SSR162).

At 10 years, the cumulative percent 2nd revision for known primary total stemmed anatomic replacement is 19.9%.

Revision of both the humeral and glenoid components is the most common 2nd revision procedure (32.8%) followed by humeral component only (32.0%), glenoid component only (8.5%), head only (8.1%), cement spacer (6.6%), and cup only (4.2%) (Table SSR217).

A total stemmed anatomic shoulder replacement has a lower rate of 2nd revision when revised to a total stemmed reverse replacement compared to a primary total stemmed reverse undergoing a 1st revision to another reverse replacement. (Table SSR218 and Figure SSR163).

A total stemmed anatomic shoulder replacement revised to a total stemmed reverse has a lower rate of 2nd revision than a primary total stemmed reverse revised to another reverse.

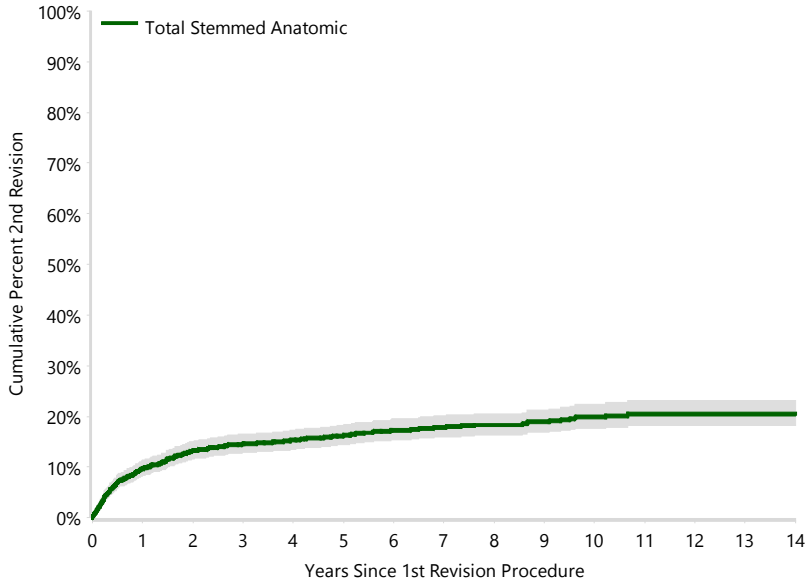
Primary total stemmed anatomic shoulder replacement implants may encompass a single design platform prosthesis (SDPP). These platform implant ranges include both anatomic and reverse shoulder replacement. They feature common design, composition metallurgy, coatings, and bearing surfaces. They allow polarity change of humeral or glenoid prostheses by modular exchange. In revision surgery the humeral stem may be retained if in the primary procedure a SDPP implant was used. The 2nd revision rate is not different regardless of whether or not the humeral stem is retained in 1st revision total stemmed anatomic replacements (Table SSR219 and Figure SSR164).

Table SSR215 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement (All Diagnoses, Excluding 1st Revision for Infection)

Revision of Primary	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemmed Anatomic	259	1581	9.8 (8.4, 11.4)	14.6 (12.9, 16.5)	16.2 (14.3, 18.2)	17.9 (15.9, 20.1)	19.9 (17.6, 22.4)	20.5 (18.1, 23.2)
TOTAL	**259**	**1581**						

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR161 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemmed Anatomic	1581	1302	1026	821	586	289	46

Table SSR216 **2nd Revision Diagnosis of Known Primary Total Stemmed Anatomic Replacement (All Diagnoses, Excluding 1st Revision for Infection)**

2nd Revision Diagnosis	Number	Percent
Instability/Dislocation	82	31.7
Loosening	64	24.7
Infection	34	13.1
Rotator Cuff Insufficiency	20	7.7
Dissociation	11	4.2
Pain	8	3.1
Fracture	8	3.1
Implant Breakage Glenoid Insert	8	3.1
Metal Related Pathology	5	1.9
Implant Breakage Glenoid	4	1.5
Malposition	3	1.2
Wear Glenoid Insert	3	1.2
Wear Glenoid	2	0.8
Osteonecrosis	1	0.4
Implant Breakage Humeral	1	0.4
Lysis	1	0.4
Wear Humeral Cup	1	0.4
Heterotopic Bone	1	0.4
Glenoid Erosion	1	0.4
Other	1	0.4
TOTAL	**259**	**100.0**

Note: Excluding 1st revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR217 **Type of 2nd Revision of Known Primary Total Stemmed Anatomic Replacement (All Diagnoses, Excluding 1st Revision for Infection)**

Type of 2nd Revision	Number	Percent
Humeral/Glenoid	85	32.8
Humeral Component	83	32.0
Glenoid Component	22	8.5
Head Only	21	8.1
Cement Spacer	17	6.6
Cup Only	11	4.2
Cup/Head	8	3.1
Removal of Prostheses	6	2.3
Head/Insert	3	1.2
Cement Only	2	0.8
Reinsertion of Components	1	0.4
TOTAL	**259**	**100.0**

Note: Excluding 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR162 **Cumulative Incidence 2nd Revision Diagnosis of Known Primary Total Stemmed Anatomic Replacement (All Diagnoses, Excluding 1st Revision for Infection)**

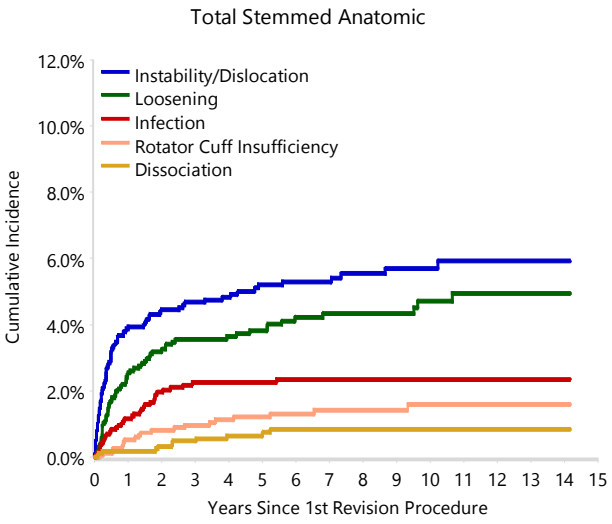
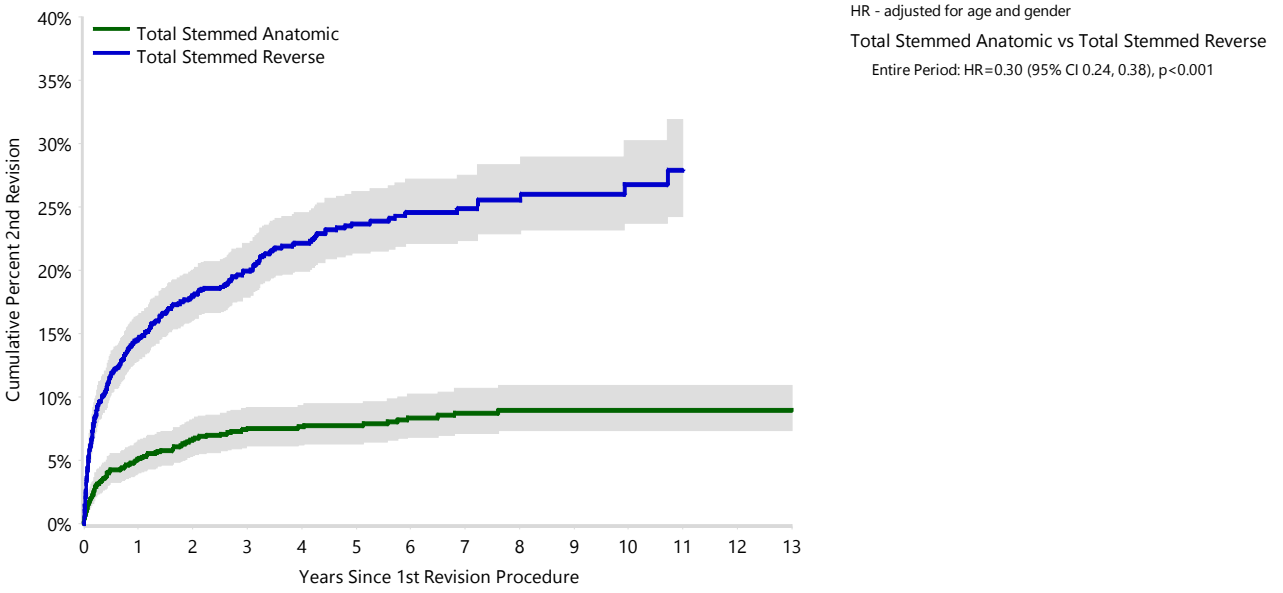


Table SSR218 **Cumulative Percent 2nd Revision of 1st Revision of Known Primary Total Shoulder Replacement by Primary Shoulder Class (1st Revision to Total Stemmed Reverse Shoulder, Excluding 1st Revision for Infection)**

Type of Primary	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Total Stemmed Anatomic	95	1234	5.2 (4.0, 6.6)	7.5 (6.1, 9.2)	7.8 (6.3, 9.5)	8.7 (7.2, 10.7)
Total Stemmed Reverse	326	1603	14.6 (12.9, 16.4)	19.9 (17.9, 22.1)	23.7 (21.4, 26.2)	24.8 (22.3, 27.5)
TOTAL	**421**	**2837**				

Figure SSR163 **Cumulative Percent 2nd Revision of 1st Revision of Known Primary Total Shoulder Replacement by Primary Shoulder Class (1st Revision to Total Stemmed Reverse Shoulder, Excluding 1st Revision for Infection)**



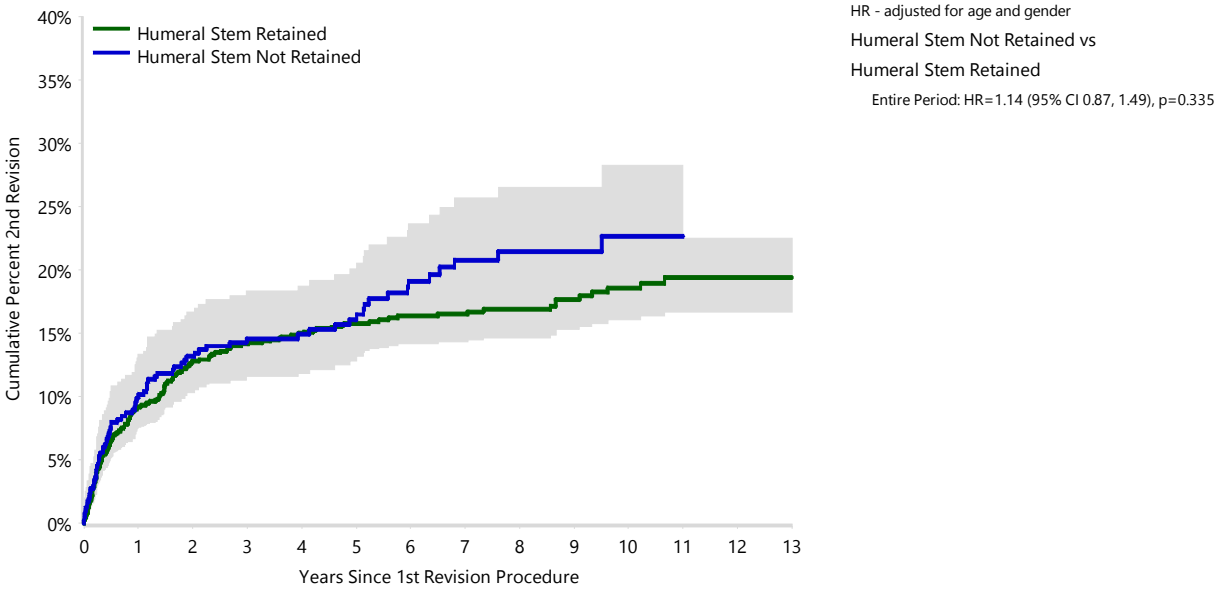
Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs
Total Stemmed Anatomic	1234	1053	837	662	455
Total Stemmed Reverse	1603	1141	733	432	237

Table SSR219 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Humeral Retention (All Diagnoses, Excluding 1st Revision for Infection and Removal of Prosthesis Only Revision)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Humeral Stem Retained	173	1092	9.2 (7.6, 11.1)	14.1 (12.1, 16.4)	15.8 (13.6, 18.2)	16.5 (14.3, 19.0)	18.6 (16.0, 21.4)
Humeral Stem Not Retained	79	472	10.1 (7.7, 13.3)	14.6 (11.6, 18.3)	16.1 (12.8, 20.1)	20.8 (16.7, 25.7)	22.6 (18.0, 28.2)
TOTAL	**252**	**1564**					

Note: Excludes 17 removal of prostheses only procedures.

Figure SSR164 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Humeral Retention (All Diagnoses, Excluding 1st Revision for Infection and Removal of Prosthesis Only Revision)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Humeral Stem Retained	1092	920	744	611	457	228
Humeral Stem Not Retained	472	372	276	207	127	59

Note: Excludes 17 removal of prostheses only procedures.

OUTCOME OF 1ST REVISION BY CLASS OF REVISION

In 2024, major total revision is the most common class of 1st revision procedure of a primary total stemmed anatomic total shoulder replacement. The yearly proportion of the 3 classes of 1st revision has changed over the past 20 years and is shown in Figure SSR165. There has been an ongoing increase in the proportion of major total 1st revisions.

The most common 2nd revision was to a minor class 1st revision, followed by 2nd revision to major partial class 1st revisions (Table SSR220).

The outcomes of the 1st revision by class of 1st revision are compared. Minor revisions have a higher rate of 2nd revision compared to major total and major partial revisions for the entire period. Major total revisions have a higher 2nd revision rate than major partial at all time periods (Table SSR220 and Figure SSR166). Both minor and major partial revisions undergo 2nd revision predominately for instability/dislocation, while major total revisions are more commonly revised for loosening (Figure SSR167).

Figure SSR165 Revision Shoulder Replacement by Class of 1st Revision (Primary Total Stemmed Anatomic Shoulder Replacement)

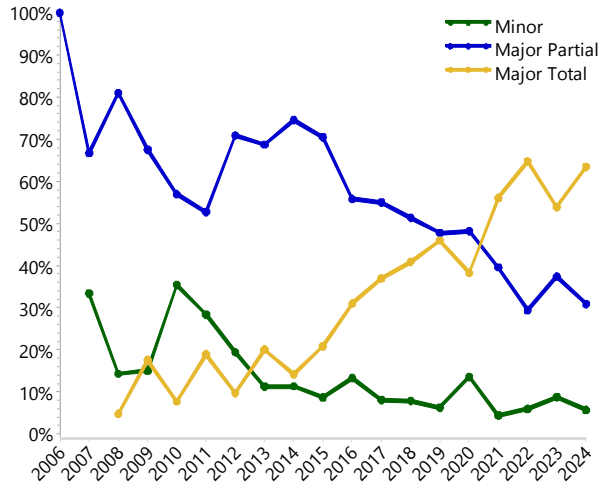
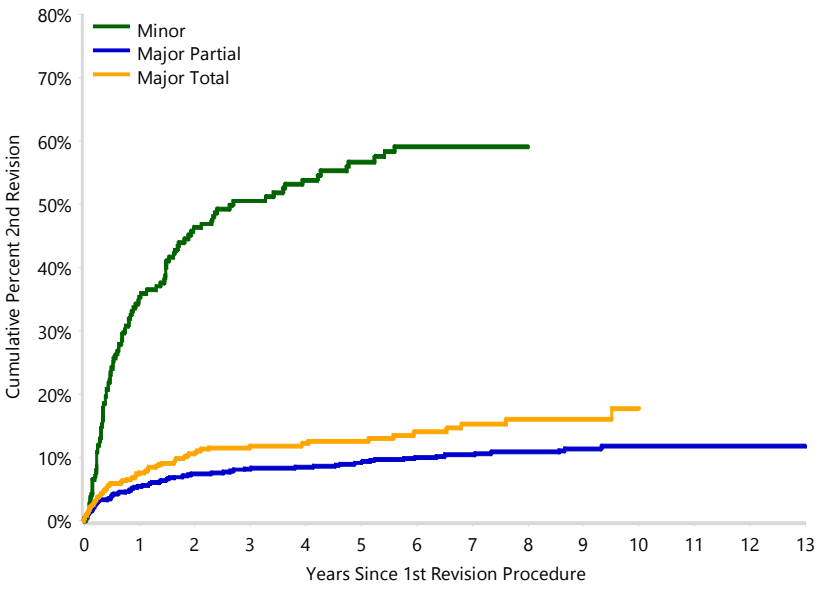


Table SSR220 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Class of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Minor	107	185	35.3 (28.9, 42.8)	50.5 (43.4, 58.1)	56.7 (49.4, 64.3)	59.1 (51.7, 66.7)	
Major Partial	85	848	5.5 (4.2, 7.3)	8.3 (6.6, 10.4)	9.2 (7.4, 11.4)	10.4 (8.4, 12.9)	11.8 (9.5, 14.5)
Major Total	67	548	7.6 (5.7, 10.3)	11.9 (9.3, 15.2)	12.6 (9.9, 16.0)	15.3 (11.9, 19.5)	17.8 (13.3, 23.6)
TOTAL	**259**	**1581**					

Note: Excluding 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR166 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



HR - adjusted for age and gender

Minor vs Major Partial

Entire Period: HR=7.63 (95% CI 5.72, 10.19), p<0.001

Minor vs Major Total

Entire Period: HR=5.05 (95% CI 3.71, 6.87), p<0.001

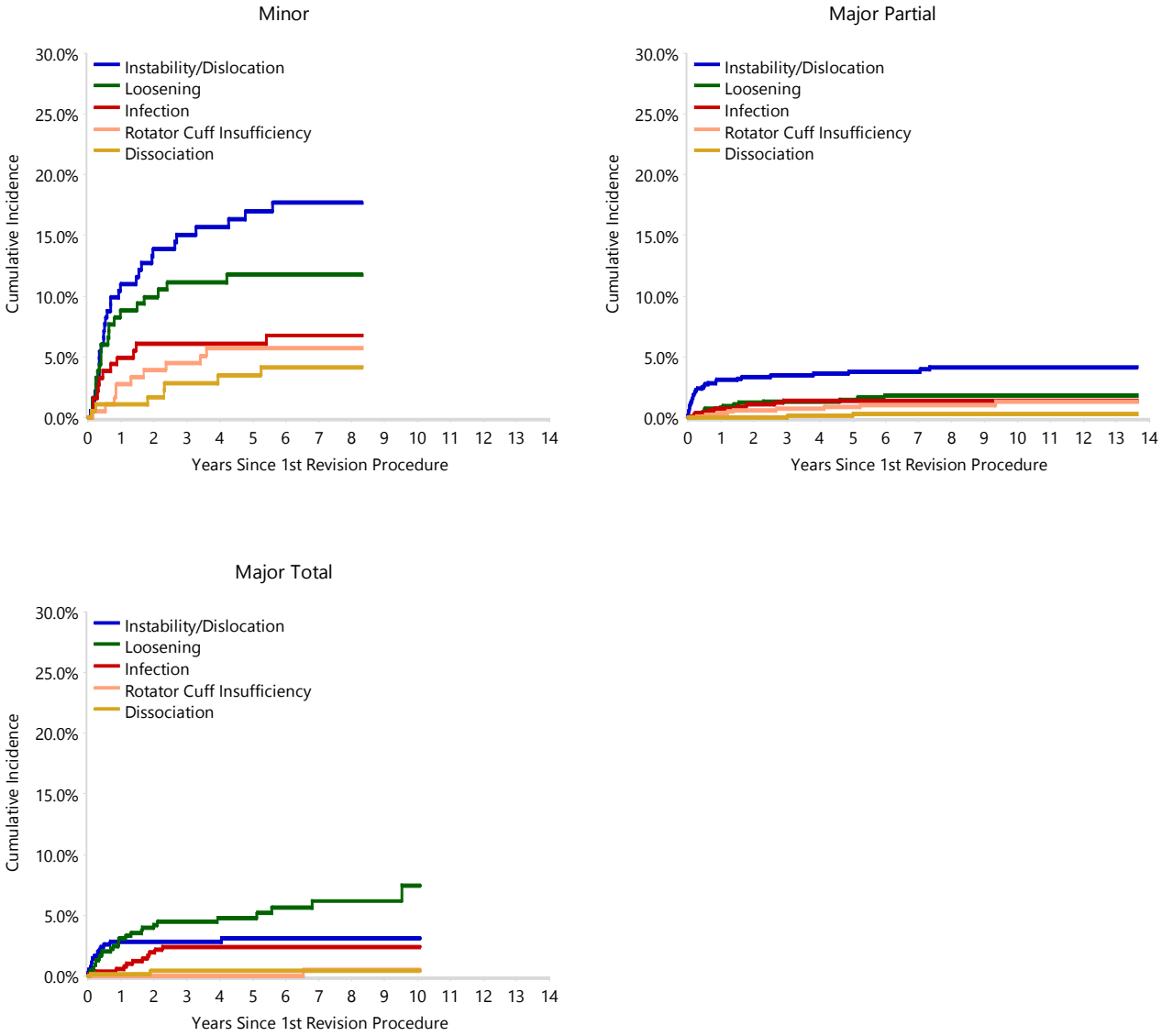
Major Total vs Major Partial

Entire Period: HR=1.51 (95% CI 1.09, 2.08), p=0.012

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Minor	185	113	76	57	46	26
Major Partial	848	758	653	552	421	221
Major Total	548	431	297	212	119	42

Note: Excluding 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR167 Cumulative Incidence 2nd Revision Diagnosis of Known Primary Total Stemmed Anatomic Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



OUTCOME OF 1ST REVISION BY TYPE OF REVISION

The most common type of 1st revision for total stemmed anatomic shoulder replacements is a humeral component, followed by humeral/glenoid combination.

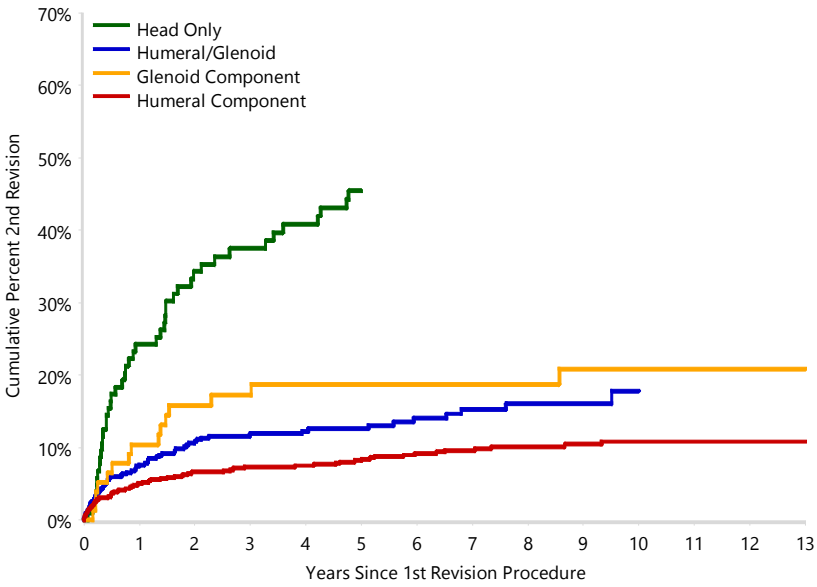
> Isolated head revision, glenoid revision and glenoid/humeral revision have an increased risk of 2nd revision when compared to humeral revision.

Isolated head revision has an increased risk of 2nd revision when compared to the humeral revision. In addition, glenoid and glenoid/humeral revision have a higher rate of 2nd revision than humeral 1st revision (Table SSR221and Figure SSR168).

Table SSR221 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Head Only	52	104	24.2 (17.1, 33.7)	37.5 (28.8, 47.7)	45.4 (36.1, 55.9)		
Humeral/Glenoid	67	548	7.6 (5.7, 10.3)	11.9 (9.3, 15.2)	12.6 (9.9, 16.0)	15.3 (11.9, 19.5)	17.8 (13.3, 23.6)
Glenoid Component	15	77	10.4 (5.4, 19.8)	17.2 (10.4, 27.9)	18.8 (11.6, 29.7)	18.8 (11.6, 29.7)	20.9 (13.0, 32.4)
Humeral Component	70	770	5.0 (3.7, 6.8)	7.4 (5.7, 9.5)	8.2 (6.4, 10.5)	9.6 (7.6, 12.1)	10.8 (8.6, 13.6)
TOTAL	**204**	**1499**					

Figure SSR168 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



HR - adjusted for age and gender

Head Only vs Humeral Component

0 - 3Mth: HR=2.51 (95% CI 1.11, 5.68), p=0.027

3Mth+: HR=7.84 (95% CI 5.31, 11.58), p<0.001

Humeral/Glenoid vs Humeral Component

Entire Period: HR=1.64 (95% CI 1.17, 2.30), p=0.004

Glenoid Component vs Humeral Component

Entire Period: HR=1.94 (95% CI 1.11, 3.40), p=0.019

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Head Only	104	76	56	45	35	19
Humeral/Glenoid	548	431	297	212	119	42
Glenoid Component	77	68	54	51	44	28
Humeral Component	770	689	598	500	376	193

HUMERAL FIXATION OUTCOME

At the time of the 1st revision, the most common fixation for an implanted humeral component is cementless, followed by no exchange of a humeral prosthesis, while the percentage of 2nd revision for no humeral exchanged 1st revision is higher than 1st revisions with cementless fixation. The method of humeral fixation at 1st revision does not change the rate of 2nd revision (Table SSR222).

Table SSR222 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Humeral Fixation of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Humeral Fixation in 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Humeral Cemented	24	197	5.7 (3.2, 10.1)	10.0 (6.4, 15.5)	11.7 (7.6, 17.6)	15.0 (10.0, 22.3)
Humeral Cementless	113	1121	6.2 (4.9, 7.8)	9.0 (7.4, 10.9)	9.7 (8.0, 11.7)	11.2 (9.3, 13.4)
No Humeral component inserted in 1st Revision	122	263	27.8 (22.8, 33.7)	40.5 (34.7, 46.8)	45.2 (39.2, 51.6)	46.7 (40.6, 53.2)
TOTAL	**259**	**1581**				

Note: Figures are not shown where the results are not statistically significant (p>0.05). They are available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

TIMING OF 1ST REVISION

The timing of the 1st revision was classified as early if it occurred within 2 years of the primary procedure (<2 years) or late if it occurred 2 years or more (≥2 years) after the primary procedure.

The reason for the 1st revision and the timing (early or late) are shown in Table SSR223.

There are 710 early 1st revisions (44.9%). In the first 3 months, the revision rate is lower for early 1st revisions compared to procedures performed later. However, from 3 months onwards, this reverses, and early 1st revisions have a higher rate of 2nd revision compared to procedures performed later (Table SSR224 and Figure SSR169).

There are 91 early 1st revisions for loosening (24.9%). There is no difference in the 2nd revision rate between early 1st revisions for loosening and those undertaken later (Table SSR225).

There are 248 early 1st revisions for instability/dislocation (67.6%). There is no difference in the 2nd revision rate between early 1st revisions for dislocation/instability and those performed later (Table SSR226).

There are 215 early 1st revisions for rotator cuff insufficiency (50.5%). Late 1st revisions have a higher rate of 2nd revision compared to early 1st revisions for rotator cuff insufficiency (Table SSR227 and Figure SSR170).

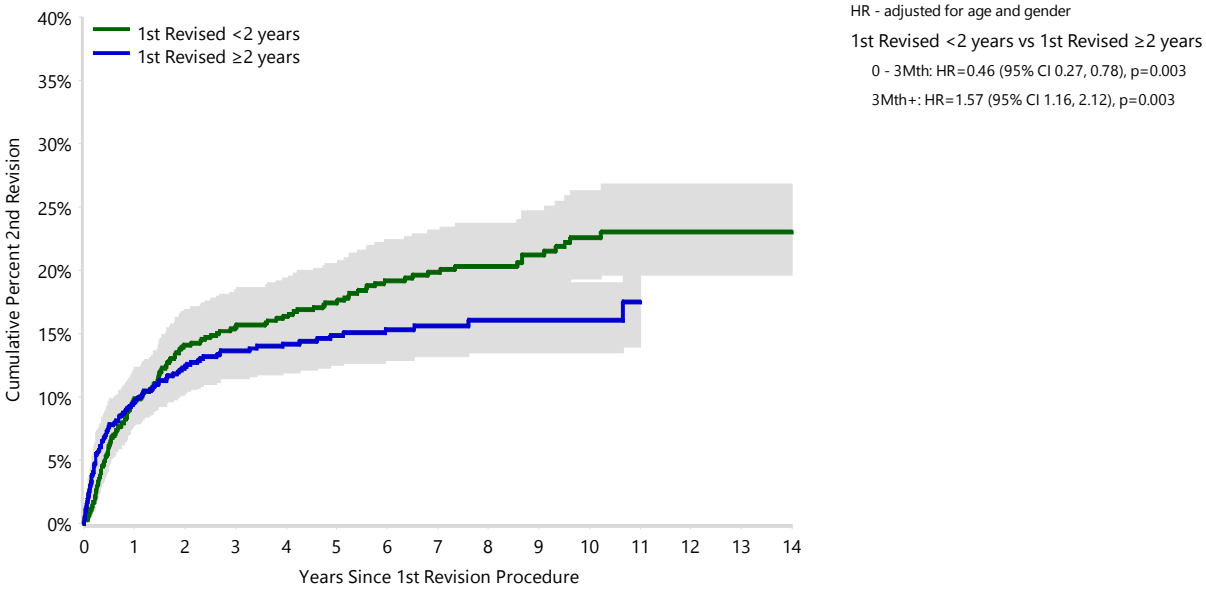
Table SSR223 Known Primary Total Stemmed Anatomic Shoulder by Timing and Reason of 1st Revision (Excluding 1st Revision for Infection)

Revision for 1st Revision	1st Revised <2 years			1st Revised ≥2 years			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Arthrofibrosis	15	71.4	2.1	6	28.6	0.7	21	100.0	1.3
Dissociation	17	28.3	2.4	43	71.7	4.9	60	100.0	3.8
Fracture	22	48.9	3.1	23	51.1	2.6	45	100.0	2.8
Glenoid Erosion	2	66.7	0.3	1	33.3	0.1	3	100.0	0.2
Implant Breakage Glenoid	6	16.2	0.8	31	83.8	3.6	37	100.0	2.3
Implant Breakage Glenoid Insert	32	31.4	4.5	70	68.6	8.0	102	100.0	6.5
Implant Breakage Head	1	50.0	0.1	1	50.0	0.1	2	100.0	0.1
Implant Breakage Humeral	.	.	.	2	100.0	0.2	2	100.0	0.1
Incorrect Sizing	17	89.5	2.4	2	10.5	0.2	19	100.0	1.2
Instability/Dislocation	248	67.6	34.9	119	32.4	13.7	367	100.0	23.2
Loosening	91	24.9	12.8	274	75.1	31.5	365	100.0	23.1
Lysis	2	7.7	0.3	24	92.3	2.8	26	100.0	1.6
Malposition	11	84.6	1.5	2	15.4	0.2	13	100.0	0.8
Metal Related Pathology	4	16.7	0.6	20	83.3	2.3	24	100.0	1.5
Pain	21	56.8	3.0	16	43.2	1.8	37	100.0	2.3
Progression Of Disease	.	.	.	3	100.0	0.3	3	100.0	0.2
Rotator Cuff Insufficiency	215	50.5	30.3	211	49.5	24.2	426	100.0	26.9
Wear Glenoid	.	.	.	1	100.0	0.1	1	100.0	0.1
Wear Glenoid Insert	2	10.0	0.3	18	90.0	2.1	20	100.0	1.3
Other	4	50.0	0.6	4	50.0	0.5	8	100.0	0.5
TOTAL	**710**	**44.9**	**100.0**	**871**	**55.1**	**100.0**	**1581**	**100.0**	**100.0**

Table SSR224 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised <2 years	139	710	9.9 (7.9, 12.3)	15.5 (13.0, 18.5)	17.5 (14.8, 20.6)	19.8 (16.9, 23.2)	22.6 (19.3, 26.3)
1st Revised ≥2 years	120	871	9.6 (7.8, 11.9)	13.7 (11.4, 16.3)	14.8 (12.5, 17.6)	15.6 (13.2, 18.6)	16.0 (13.5, 19.1)
TOTAL	**259**	**1581**					

Figure SSR169 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised <2 years	710	615	515	447	344	200
1st Revised ≥2 years	871	687	511	374	242	89

Table SSR225 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Time of 1st Revision (All Diagnoses, 1st Revision for Loosening)

Time of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised for Loosening <2 years	20	91	15.6 (9.6, 24.9)	21.5 (14.3, 31.7)	21.5 (14.3, 31.7)	21.5 (14.3, 31.7)	24.2 (16.0, 35.7)
1st Revised for Loosening ≥2 years	44	274	11.2 (7.9, 15.8)	17.0 (12.8, 22.5)	18.6 (14.0, 24.4)	18.6 (14.0, 24.4)	
TOTAL	**64**	**365**					

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR226 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Time of 1st Revision (All Diagnoses, 1st Revision for Instability/Dislocation)

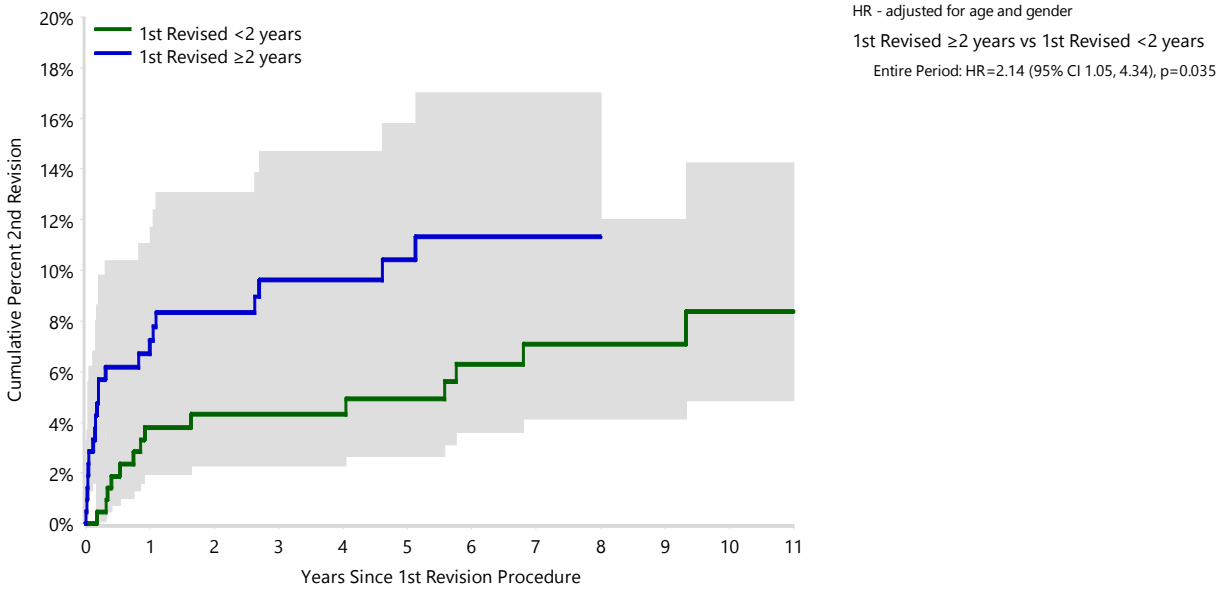
Time of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised for Dislocation/ Instability <2 years	43	248	9.9 (6.7, 14.3)	13.3 (9.6, 18.4)	15.4 (11.3, 20.8)	17.8 (13.3, 23.6)	20.5 (15.4, 27.0)
1st Revised for Dislocation/ Instability ≥2 years	16	119	9.5 (5.4, 16.6)	13.7 (8.4, 21.7)	15.4 (9.6, 24.2)		
TOTAL	**59**	**367**					

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR227 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Time of 1st Revision (All Diagnoses, 1st Revision for Rotator Cuff Insufficiency)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised <2 years	14	215	3.8 (1.9, 7.5)	4.3 (2.3, 8.1)	4.9 (2.7, 9.0)	7.1 (4.1, 12.0)	8.4 (4.9, 14.2)
1st Revised ≥2 years	22	211	7.2 (4.4, 11.7)	9.6 (6.2, 14.7)	10.4 (6.8, 15.8)	11.3 (7.4, 17.0)	
TOTAL	**36**	**426**					

Figure SSR170 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Time of 1st Revision (All Diagnoses, 1st Revision for Rotator Cuff Insufficiency)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised <2 years	215	197	170	149	111	61
1st Revised ≥2 years	211	172	137	101	59	11

OUTCOME OF 1ST REVISION BY PATIENT CHARACTERISTICS

The outcome of the 1st revision of primary total stemmed anatomic shoulder replacement varies by age and gender. Females aged <65 years have a higher rate of 2nd revision than females aged ≥65 years (Table SSR228 and Figure SSR171).

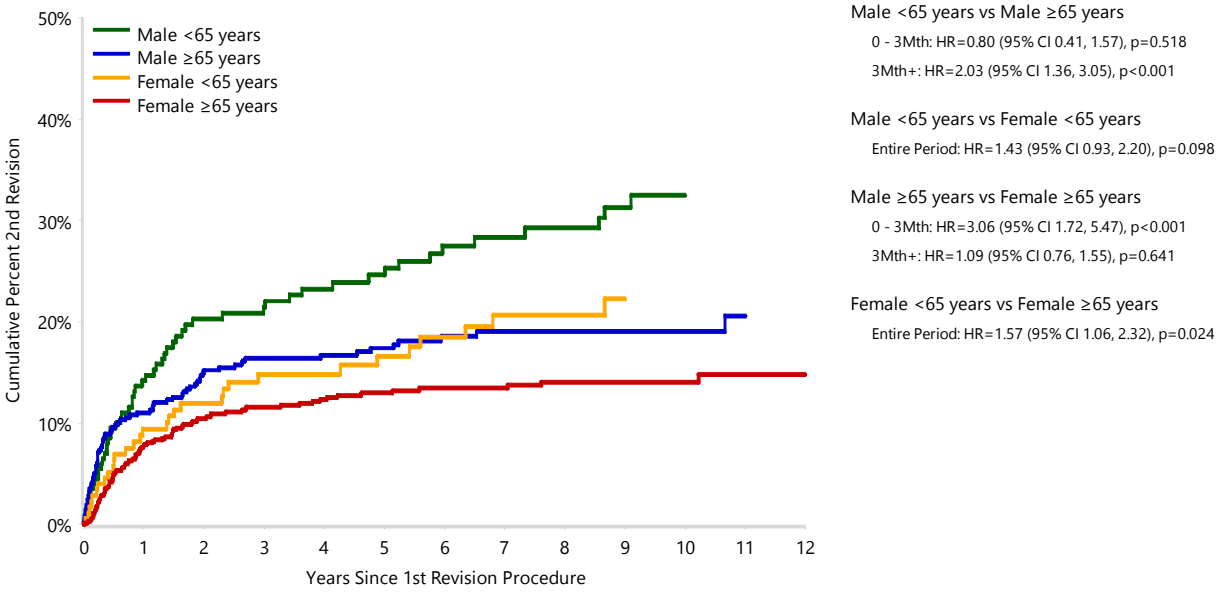
Males aged <65 years have a higher rate of 2nd revision than males aged ≥65 years from 3 months after the 1st revision. Males aged ≥65 years have a higher rate of revision compared to females of the same age group in the first 3 months, with no difference after this time.

Table SSR228 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Gender and Age (All Diagnoses, Excluding 1st Revision for Infection)

Gender	Age at 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Male	<65 years	55	201	14.2 (10.0, 19.9)	21.4 (16.2, 28.0)	24.6 (19.0, 31.5)	28.3 (22.2, 35.7)	32.5 (25.6, 40.6)
	≥65 years	77	456	11.0 (8.5, 14.3)	16.4 (13.1, 20.3)	17.4 (14.0, 21.5)	19.0 (15.4, 23.4)	19.0 (15.4, 23.4)
Female	<65 years	34	175	9.4 (5.9, 14.9)	14.8 (10.2, 21.4)	16.6 (11.5, 23.5)	20.6 (14.7, 28.5)	
	≥65 years	93	749	7.9 (6.1, 10.1)	11.6 (9.4, 14.2)	13.0 (10.6, 15.7)	13.4 (11.0, 16.3)	14.1 (11.5, 17.1)
TOTAL		**259**	**1581**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR171 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Gender and Age (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Male	<65 years	201	162	132	110	81	48
	≥65 years	456	358	279	224	153	74
Female	<65 years	175	145	110	93	68	39
	≥65 years	749	637	505	394	284	128

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

ASA SCORE AND BMI CATEGORY

ASA score is available for 1,199 1st revision of primary total stemmed anatomic shoulder replacements. There is no difference in the rate of 2nd revision between patients with ASA scores of 1-4 (Table SSR229). BMI is recorded for 968 1st revision procedures. The rate of 2nd revision did not differ between BMI classes (Table SSR230).

Table SSR229 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by ASA (All Diagnoses, Excluding 1st Revision for Infection)

ASA Grade	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
ASA 1	5	37	8.3 (2.8, 23.7)	14.6 (6.3, 31.6)	14.6 (6.3, 31.6)	14.6 (6.3, 31.6)	14.6 (6.3, 31.6)
ASA 2	68	527	7.5 (5.5, 10.2)	12.3 (9.6, 15.6)	13.6 (10.8, 17.1)	14.4 (11.5, 18.1)	16.2 (12.6, 20.7)
ASA 3	78	610	9.5 (7.4, 12.2)	12.0 (9.5, 15.0)	13.2 (10.6, 16.4)	15.9 (12.7, 19.8)	
ASA 4	4	25	16.0 (6.3, 37.2)	16.0 (6.3, 37.2)	16.0 (6.3, 37.2)	16.0 (6.3, 37.2)	
TOTAL	**155**	**1199**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.
Excludes 382 procedures with no ASA score recorded.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR230 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by BMI (All Diagnoses, Excluding 1st Revision for Infection)

BMI Category	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Underweight	0	6	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	
Normal	18	157	7.9 (4.6, 13.5)	10.2 (6.3, 16.4)	13.0 (8.3, 19.9)	13.0 (8.3, 19.9)	
Pre Obese	39	303	7.5 (5.0, 11.2)	10.9 (7.7, 15.2)	12.2 (8.8, 16.8)	15.2 (11.2, 20.4)	16.3 (11.9, 22.2)
Obese Class 1	29	283	8.3 (5.5, 12.3)	10.4 (7.3, 14.8)	10.9 (7.7, 15.5)	11.6 (8.2, 16.4)	11.6 (8.2, 16.4)
Obese Class 2	16	141	9.0 (5.2, 15.3)	9.0 (5.2, 15.3)	10.0 (5.9, 16.7)	11.4 (6.8, 18.7)	
Obese Class 3	11	78	11.8 (6.3, 21.5)	13.3 (7.4, 23.3)	13.3 (7.4, 23.3)	13.3 (7.4, 23.3)	13.3 (7.4, 23.3)
TOTAL	**113**	**968**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted
Excludes 613 procedures with no BMI recorded.
BMI has not been presented for patients aged ≤19 years.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

CHANGES IN REVISION SHOULDER SURGERY OVER TIME

The most common reason for 1st revision has changed over time. In 2008, the majority of 1st revision procedures were performed for loosening or instability/dislocation, but since 2022, loosening has been more common (Figure SSR172).

Up to 2020, the most common 1st revision of primary total stemmed anatomic shoulder arthroplasty was a partial major revision.

After that time, major total revision has predominated (Figure SSR165). In 2024, 63.4% of 1st revisions are major total, 30.9% major partial and 5.7% are minor.

The type of fixation of the humeral component at the 1st revision remains predominately cementless when the humeral component is exchanged (Figure SSR173).

The results of the 1st revision are stratified by the reason for the 1st revision in the following section.

Figure SSR172 **Revision Shoulder Replacement by Class (Primary Total Stemmed Anatomic Shoulder Replacement) by Reason for 1st Revision**

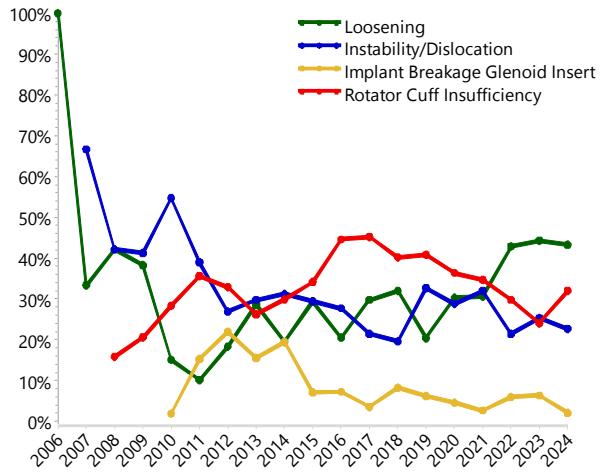
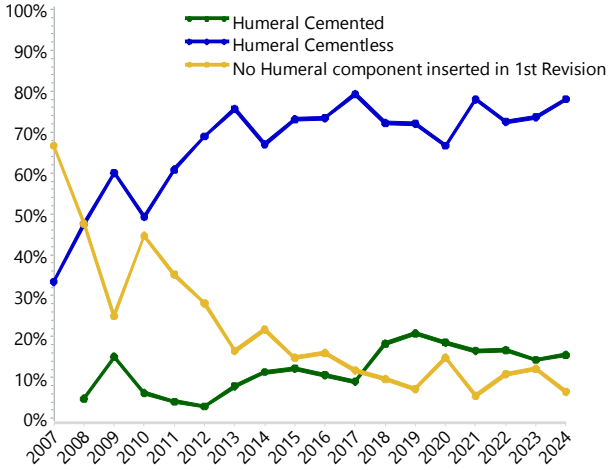


Figure SSR173 **Primary Known 1st Revision Shoulder Replacement by Humeral Fixation (All Diagnoses, Primary class Total Stemmed Anatomic, Excluding 1st Revision for Infection) by Humeral Fixation in 1st Revision**



OUTCOMES OF THE 1ST REVISION BY REASON FOR 1ST REVISION

Further analyses on the outcomes of the most common reasons for 1st revision have been performed. These include loosening, prosthesis instability/dislocation, implant breakage of the glenoid insert, and rotator cuff insufficiency.

When compared to rotator cuff insufficiency, loosening and prosthesis instability/dislocation have a higher rate of 2nd revision. Implant breakage of the glenoid insert also has a higher rate of 2nd revision compared to rotator cuff insufficiency, but only after 6 months (Table SSR231 and Figure SSR174).

Instability/dislocation, loosening and implant breakage at 1st revision were predominately revised for the same reasons at the 2nd revision. 1st revisions for rotator cuff insufficiency most commonly underwent 2nd revision for instability/dislocation (Table SSR232).

Loosening and prosthesis instability/dislocation have a higher rate of 2nd revision compared to rotator cuff insufficiency.

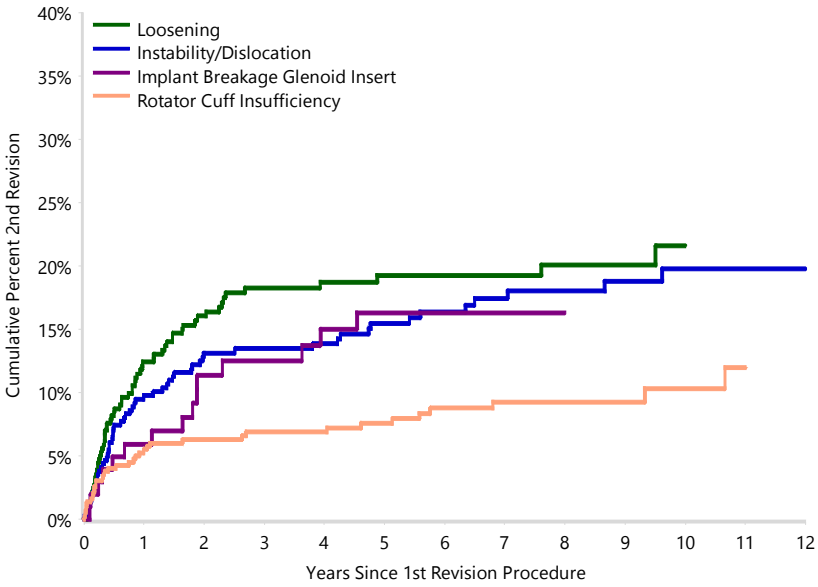
When the 1st revision is for loosening or instability/dislocation, the most common 2nd revision involves both humeral and glenoid components. In contrast, 1st revisions for implant breakage and rotator cuff insufficiency most commonly undergo 2nd revision of the humeral component only (Table SSR233).

Table SSR231 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Reason for 1st Revision (All Diagnoses)

Reason for 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Loosening	64	365	12.4 (9.4, 16.4)	18.3 (14.5, 22.9)	19.3 (15.3, 24.1)	19.3 (15.3, 24.1)	21.6 (16.8, 27.6)
Instability/Dislocation	59	367	9.8 (7.1, 13.3)	13.5 (10.3, 17.5)	15.5 (12.0, 19.9)	17.4 (13.6, 22.2)	19.8 (15.4, 25.3)
Implant Breakage Glenoid Insert	18	102	5.9 (2.7, 12.7)	12.5 (7.3, 21.0)	16.3 (10.1, 25.7)	16.3 (10.1, 25.7)	
Rotator Cuff Insufficiency	36	426	5.5 (3.7, 8.2)	6.9 (4.8, 9.8)	7.6 (5.3, 10.7)	9.3 (6.6, 12.9)	10.3 (7.2, 14.7)
TOTAL	**177**	**1260**					

Note: Excluding 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR174 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Reason for 1st Revision (All Diagnoses)



HR - adjusted for age and gender

Loosening vs Rotator Cuff Insufficiency

Entire Period: HR=2.29 (95% CI 1.52, 3.45), p<0.001

Instability/Dislocation vs Rotator Cuff Insufficiency

Entire Period: HR=1.80 (95% CI 1.19, 2.73), p=0.005

Implant Breakage Glenoid Insert vs Rotator Cuff Insufficiency

0 - 3Mth: HR=1.25 (95% CI 0.37, 4.17), p=0.721

3Mth - 6Mth: HR=1.20 (95% CI 0.28, 5.20), p=0.802

6Mth+: HR=2.39 (95% CI 1.24, 4.60), p=0.009

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Loosening	365	279	194	149	103	48
Instability/Dislocation	367	310	252	200	142	78
Implant Breakage Glenoid Insert	102	93	73	62	48	27
Rotator Cuff Insufficiency	426	369	307	250	170	72

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR232 Revision Diagnosis of 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Reason for 1st Revision (All Diagnoses)

2nd Revision Diagnosis	Loosening		Instability/ Dislocation		Implant Breakage Glenoid Insert		Rotator Cuff Insufficiency		TOTAL	
	N	Col%	N	Col%	N	Col%	N	Col%	N	Col%
Instability/Dislocation	9	14.1	31	52.5	2	11.1	12	33.3	54	30.5
Loosening	30	46.9	10	16.9	1	5.6	10	27.8	51	28.8
Infection	14	21.9	5	8.5	.	.	5	13.9	24	13.6
Rotator Cuff Insufficiency	3	4.7	5	8.5	.	.	3	8.3	11	6.2
Pain	3	4.7	2	3.4	.	.	2	5.6	7	4.0
Dissociation	2	3.1	1	1.7	4	22.2	.	.	7	4.0
Implant Breakage Glenoid Insert	.	.	.	.	5	27.8	.	.	5	2.8
Wear Glenoid Insert	1	1.6	1	1.7	1	5.6	.	.	3	1.7
Implant Breakage Glenoid	.	.	.	.	3	16.7	.	.	3	1.7
Fracture	1	1.6	1	1.7	.	.	1	2.8	3	1.7
Malposition	.	.	1	1.7	.	.	1	2.8	2	1.1
Metal Related Pathology	.	.	1	1.7	1	5.6	.	.	2	1.1
Osteonecrosis	1	1.6	.	.	.	.	.	.	1	0.6
Implant Breakage Humeral	.	.	.	.	1	5.6	.	.	1	0.6
Lysis	.	.	.	.	.	.	1	2.8	1	0.6
Glenoid Erosion	.	.	1	1.7	.	.	.	.	1	0.6
Other	.	.	.	.	.	.	1	2.8	1	0.6
TOTAL	**64**	**100.0**	**59**	**100.0**	**18**	**100.0**	**36**	**100.0**	**177**	**100.0**

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR233 Type of 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses)

Type of 2nd Revision	Loosening		Instability/ Dislocation		Implant Breakage Glenoid Insert		Rotator Cuff Insufficiency		TOTAL	
	N	Col%	N	Col%	N	Col%	N	Col%	N	Col%
Humeral Component	10	15.6	20	33.9	13	72.2	14	38.9	57	32.2
Humeral/Glenoid	24	37.5	21	35.6	2	11.1	7	19.4	54	30.5
Head Only	9	14.1	6	10.2	1	5.6	3	8.3	19	10.7
Glenoid Component	7	10.9	3	5.1	1	5.6	3	8.3	14	7.9
Cement Spacer	8	12.5	4	6.8	.	.	2	5.6	14	7.9
Cup Only	1	1.6	2	3.4	.	.	4	11.1	7	4.0
Cup/Head	.	.	2	3.4	.	.	2	5.6	4	2.3
Removal of Prostheses	2	3.1	.	.	.	.	1	2.8	3	1.7
Head/Insert	.	.	1	1.7	1	5.6	.	.	2	1.1
Cement Only	2	3.1	.	.	.	.	.	.	2	1.1
Reinsertion of Components	1	1.6	.	.	.	.	.	.	1	0.6
TOTAL	**64**	**100.0**	**59**	**100.0**	**18**	**100.0**	**36**	**100.0**	**177**	**100.0**

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

LOOSENING

There are 365 1st revision total stemmed anatomic shoulder replacements for loosening, and 46 of these have had a 2nd revision (Table SSR234).

The most common 1st revision for loosening is humeral/glenoid revision, followed by isolated humeral and glenoid revisions. There is no difference in the cumulative percent 2nd revision comparing types of 1st revision (Table SSR234).

Where the humeral component is revised in a 1st revision for loosening, the fixation chosen is most commonly cementless. There is no difference in the rate of 2nd revision comparing the fixation of a revised humeral component (Table SSR235).

Table SSR234 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Loosening)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Head Only	5	24	12.9 (4.3, 34.8)	22.6 (10.0, 46.3)	22.6 (10.0, 46.3)	22.6 (10.0, 46.3)	22.6 (10.0, 46.3)
Humeral/Glenoid	23	213	5.5 (3.1, 9.7)	11.2 (7.3, 16.8)	12.1 (8.0, 18.2)	12.1 (8.0, 18.2)	
Glenoid Component	9	48	12.6 (5.9, 25.9)	19.2 (10.5, 33.6)	19.2 (10.5, 33.6)	19.2 (10.5, 33.6)	19.2 (10.5, 33.6)
Humeral Component	9	49	12.3 (5.7, 25.3)	16.8 (8.8, 30.9)	19.5 (10.6, 34.3)	19.5 (10.6, 34.3)	19.5 (10.6, 34.3)
TOTAL	**46**	**334**					

Note: Excludes 31 1st revisions with other minor revision types.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR235 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Humeral Fixation of 1st Revision (All Diagnoses, 1st Revision for Loosening)

Humeral Fixation in 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Humeral Cemented	8	91	3.4 (1.1, 10.2)	9.1 (4.4, 18.4)	9.1 (4.4, 18.4)	9.1 (4.4, 18.4)
Humeral Cementless	24	171	8.7 (5.2, 14.2)	14.0 (9.3, 20.7)	16.4 (11.1, 24.0)	16.4 (11.1, 24.0)
No Humeral component inserted in 1st Revision	32	103	26.1 (18.6, 35.9)	32.6 (24.3, 42.9)	32.6 (24.3, 42.9)	
TOTAL	**64**	**365**				

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

INSTABILITY/DISLOCATION

Instability/dislocation is the second most common 1st revision diagnosis for total stemmed anatomic shoulder replacement. There are 349 1st revision total stemmed anatomic shoulder replacements for instability/dislocation, and 52 of these have had a 2nd revision.

The most common 1st revision for instability/dislocation is isolated humeral revision, followed by revision of the humeral and glenoid components.

There is no difference in the rate of 2nd revision when these two types of revision are compared.

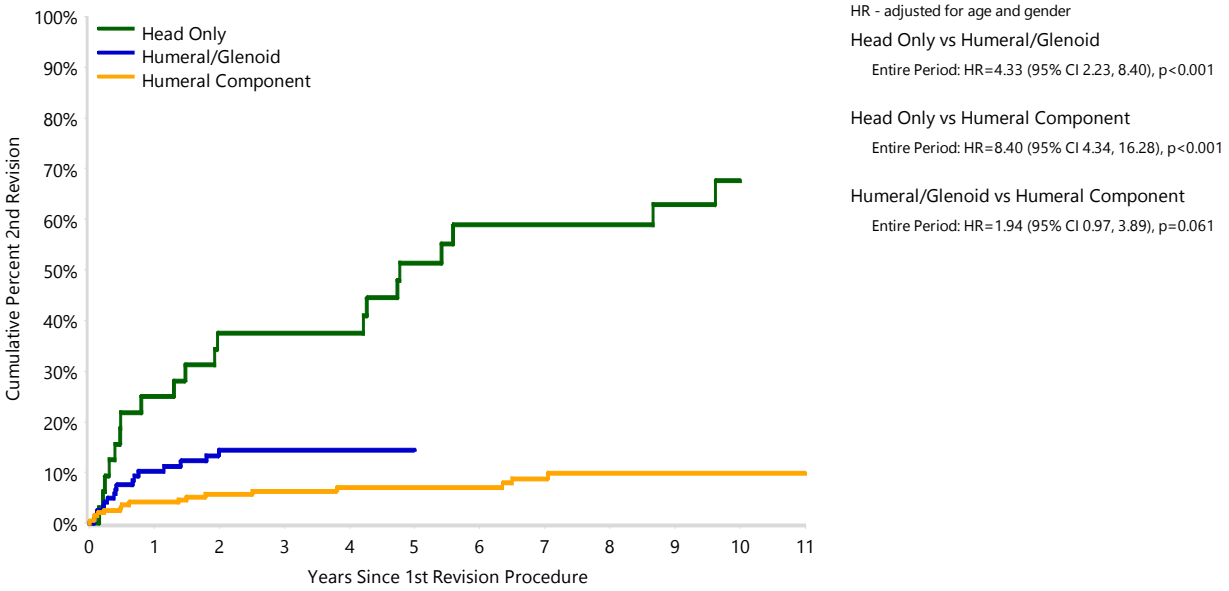
Head only 1st revisions for instability/dislocation are the least common form of revision procedure. When performed for instability/dislocation, they are associated with a higher rate of 2nd revision compared to isolated humeral and humeral glenoid combinations (Table SSR236 and Figure SSR175).

Table SSR236 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Instability/Dislocation)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Head Only	20	32	25.0 (13.4, 43.8)	37.5 (23.3, 56.5)	51.4 (35.3, 69.8)	58.9 (42.1, 76.4)	67.6 (50.1, 84.0)
Humeral/Glenoid	16	122	10.3 (6.0, 17.4)	14.4 (9.1, 22.6)	14.4 (9.1, 22.6)		
Humeral Component	16	195	4.1 (2.1, 8.1)	6.4 (3.7, 10.9)	7.0 (4.1, 11.8)	8.8 (5.3, 14.4)	9.8 (6.0, 15.8)
TOTAL	**52**	**349**					

Note: Excludes 18 1st revisions with other minor revision types.

Figure SSR175 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Instability/Dislocation)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Head Only	32	24	18	14	10	6
Humeral/Glenoid	122	94	70	52	32	15
Humeral Component	195	182	156	126	92	51

ROTATOR CUFF INSUFFICIENCY

There are 415 primary total stemmed anatomic shoulder replacements that have been revised for rotator cuff insufficiency, and 30 of these have had a 2nd revision.

The most common type of 1st revision for rotator cuff insufficiency is isolated humeral component revision, followed by combined humeral/glenoid revision. There is no difference in the rate of 2nd revision when these two types of revision are compared (Table SSR237).

Table SSR237 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Rotator Cuff Insufficiency)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Humeral/Glenoid	13	144	5.0 (2.4, 10.2)	6.6 (3.5, 12.3)	7.9 (4.2, 14.3)		
Glenoid Component	0	1					
Humeral Component	17	270	4.2 (2.3, 7.4)	5.4 (3.3, 9.0)	5.9 (3.6, 9.7)	6.5 (4.0, 10.4)	7.8 (4.7, 12.8)
TOTAL	**30**	**415**					

Note: Excludes 11 1st revisions with other minor revision types.

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OUTCOMES OF 1ST REVISION OVER TIME

This analysis compares the outcomes of 1st revisions of total stemmed anatomic replacement over two successive time periods: pre 2016 and 2016–2024. There has been an improvement in the rate of 2nd revision comparing the most recent period to pre 2016 (Table SSR238 and Figure SSR176).

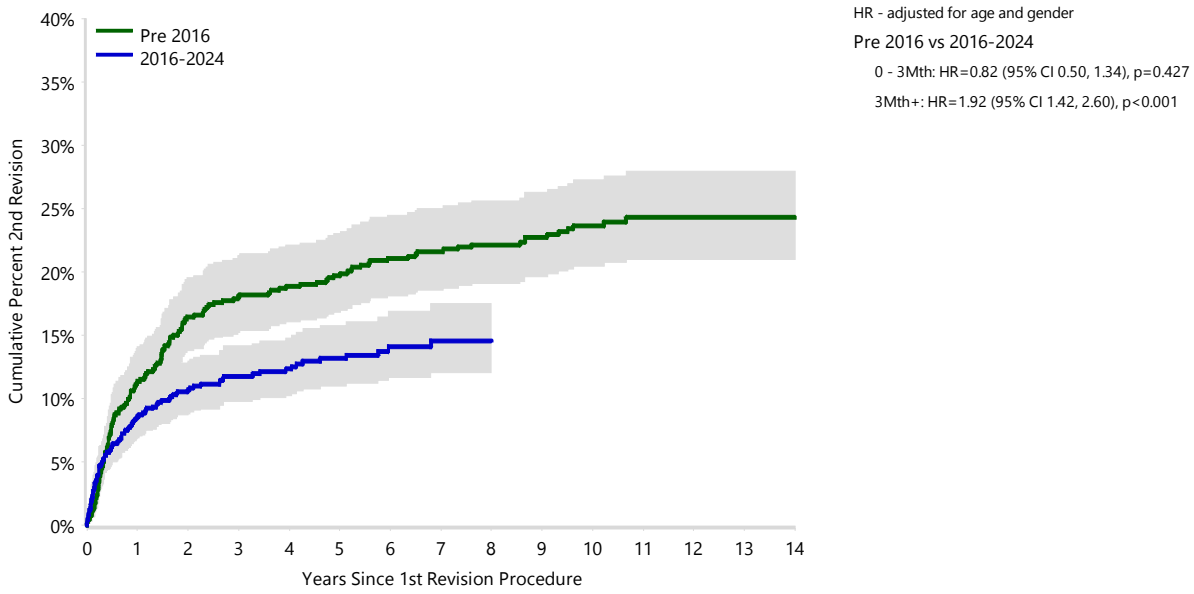
There has been a reduction in the cumulative percent revision for instability/dislocation between the two time periods (Figure SSR177, Table SSR239 and Figure SSR178). There is no difference in the rate of 2nd revision for infection or loosening for time periods pre 2016 and 2016-2024 (Table SSR240 and Table SSR241).

Table SSR238 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	148	643	11.4 (9.1, 14.1)	18.1 (15.3, 21.3)	19.7 (16.8, 23.0)	21.6 (18.6, 25.0)	23.7 (20.5, 27.3)
2016-2024	111	938	8.6 (6.9, 10.6)	11.8 (9.8, 14.2)	13.2 (11.0, 15.8)	14.6 (12.1, 17.5)	
TOTAL	**259**	**1581**					

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR176 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	643	566	503	474	431	289
2016-2024	938	736	523	347	155	0

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR177 Cumulative Incidence 2nd Revision Diagnosis of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

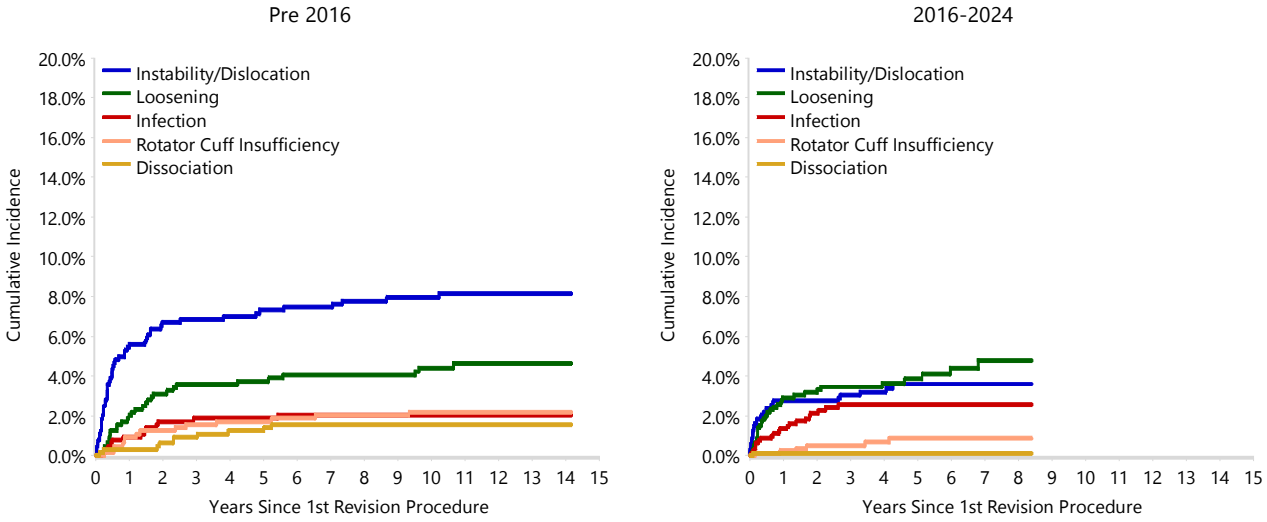
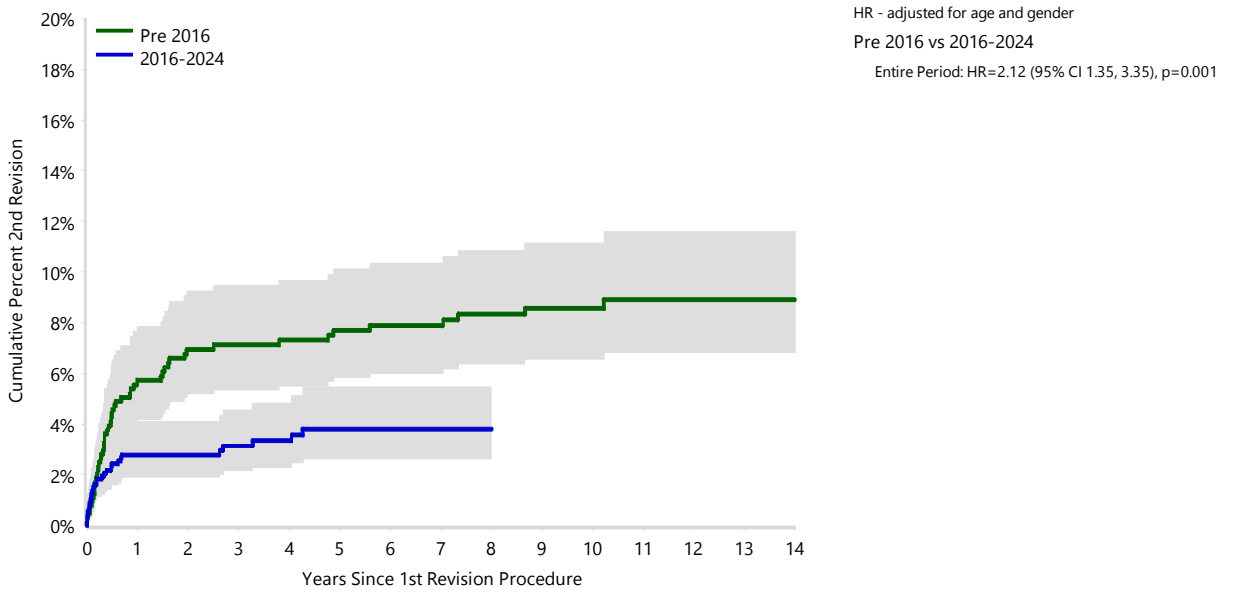


Table SSR239 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Dislocation/Instability)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Pre 2016	52	643	5.7 (4.2, 7.8)	7.1 (5.3, 9.5)	7.7 (5.8, 10.1)	7.9 (6.0, 10.4)	8.6 (6.6, 11.1)	8.9 (6.8, 11.6)
2016-2024	30	938	2.8 (1.9, 4.1)	3.1 (2.1, 4.6)	3.8 (2.6, 5.5)	3.8 (2.6, 5.5)		
TOTAL	**82**	**1581**						

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR178 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Dislocation/Instability)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Pre 2016	643	566	503	474	431	289	46
2016-2024	938	736	523	347	155	0	0

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR240 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Infection)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Pre 2016	13	643	1.0 (0.4, 2.2)	2.1 (1.2, 3.7)	2.1 (1.2, 3.7)	2.3 (1.3, 3.9)	2.3 (1.3, 3.9)	2.3 (1.3, 3.9)
2016-2024	21	938	1.4 (0.8, 2.5)	2.8 (1.8, 4.2)	2.8 (1.8, 4.2)	2.8 (1.8, 4.2)		
TOTAL	**34**	**1581**						

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR241 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Anatomic Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Loosening)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Pre 2016	29	643	2.1 (1.3, 3.7)	3.9 (2.6, 5.9)	4.1 (2.8, 6.1)	4.6 (3.1, 6.6)	5.1 (3.6, 7.4)	5.6 (3.8, 8.0)
2016-2024	35	938	3.0 (2.1, 4.4)	3.6 (2.5, 5.1)	4.1 (2.9, 5.8)	5.3 (3.6, 7.7)		
TOTAL	**64**	**1581**						

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

MORTALITY FOLLOWING THE 1ST REVISION

Mortality following a 1st revision of total stemmed anatomic shoulder replacement has been calculated for all 1st revision procedures and according to the more common 1st revision diagnoses.

The overall mortality is 0.1% at 30 days, 0.1% at 90 days, 0.7% at 1 year and 24.0% at 10 years (Table SSR242 and Figure SSR179).

Overall, the mortality after 1st revision of total stemmed anatomic shoulder replacement does not change depending on the reason for 1st revision or the class of the 1st revision (Table SSR244 and Table SSR245).

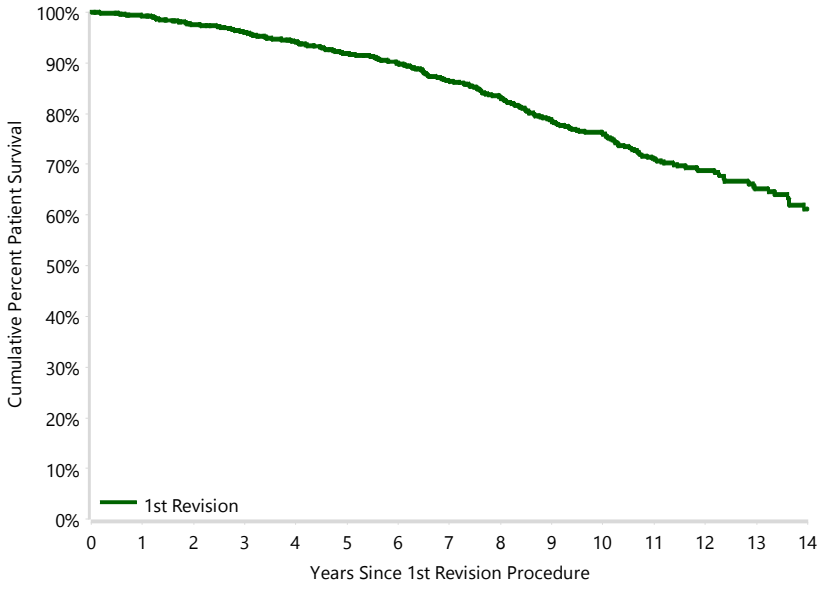
The cumulative percentage survival of the 1st revision total stemmed anatomic shoulder replacement is lower than an unrevised primary total stemmed anatomic (Table SSR243 and Figure SSR180).

The overall mortality is 0.1% at 30 days, 0.1% at 90 days, 0.7% at 1 year and 24.0% at 10 years.

Table SSR242 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Anatomic Replacement since 1st Revised (Excluding 1st Revision for Infection)

1st Revision	N Deceased	N Total	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revision	278	1536	99.9 (99.5, 100.0)	99.9 (99.5, 100.0)	99.3 (98.7, 99.6)	96.1 (94.9, 97.0)	91.8 (90.1, 93.2)	86.4 (84.3, 88.3)	76.0 (73.0, 78.7)
TOTAL	**278**	**1536**							

Figure SSR179 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Anatomic Replacement since 1st Revised (Excluding 1st Revision for Infection)



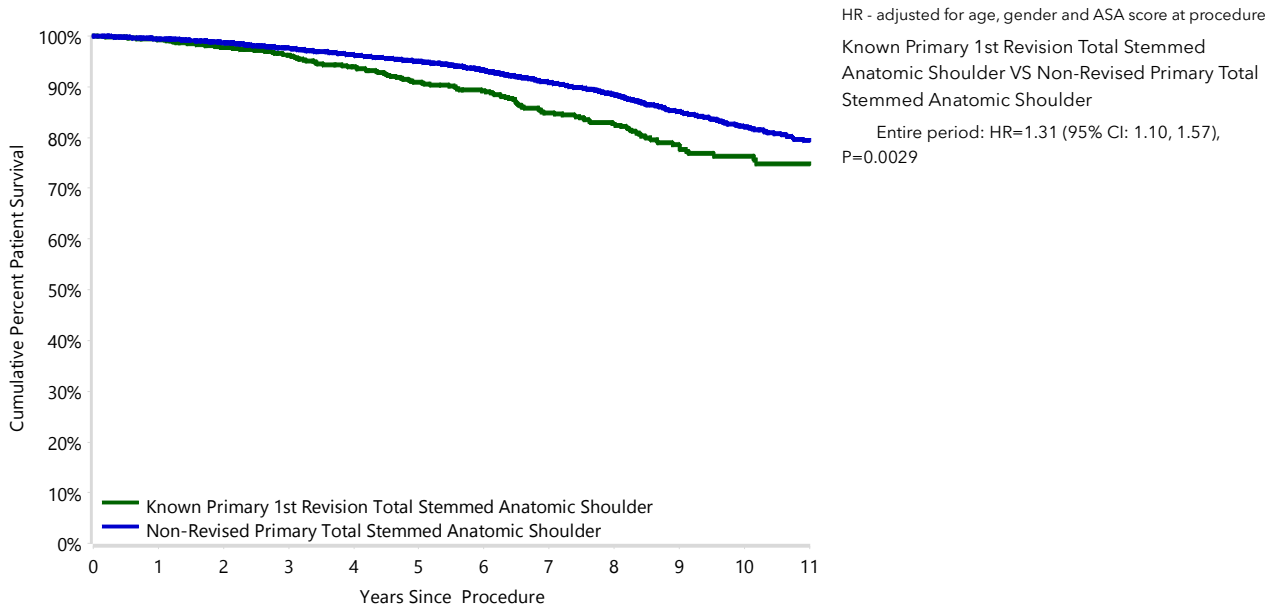
Number at Risk	0 Yr	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revision	1536	1531	1513	1410	1185	981	736	402

Table SSR243 Cumulative Percent Survival of Patients with Non-Revised Primary Total Stemmed Anatomic Shoulder and Known Primary 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Procedure Type	N Deceased	N Total	1 Yr	5 Yrs	10 Yrs	15 Yrs
Known Primary 1st Revision Total Stemmed Anatomic Shoulder	142	1156	99.3 (98.5, 99.6)	90.9 (88.7, 92.6)	76.4 (72.1, 80.1)	
Non-Revised Primary Total Stemmed Anatomic Shoulder	933	9053	99.5 (99.3, 99.6)	95.0 (94.5, 95.5)	82.3 (81.0, 83.4)	
TOTAL	**1075**	**10209**				

Note: Restricted to the first of the revision or primary procedures for bilateral patients in each procedure type with known age, sex and ASA score.
Time to survival is time from the primary procedure to death for the non-revised primary cohort and from the 1st revision procedure to death for the known primary 1st revision cohort

Figure SSR180 Cumulative Percent Survival of Patients with Non-Revised Primary Total Stemmed Anatomic Shoulder and Known Primary 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	5 Yrs	10 Yrs	15 Yrs
Known Primary 1st Revision Total Stemmed Anatomic Shoulder	1156	1032	625	116	0
Non-Revised Primary Total Stemmed Anatomic Shoulder	9053	8665	6191	1381	1

Note: Restricted to the first of the revision or primary procedures for bilateral patients in each procedure type with known age, sex and ASA score.
Time to survival is time from the primary procedure to death for the non-revised primary cohort and from the 1st revision procedure to death for the known primary 1st revision cohort

Table SSR244 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Anatomic Replacement since 1st Revised by Reason for 1st Revision

Reason for 1st Revision	N Deceased	N Total	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	10 Yrs
Rotator Cuff Insufficiency	76	414	100.0 (100.0, 100.0)	99.8 (98.3, 100.0)	99.0 (97.4, 99.6)	95.2 (92.5, 97.0)	91.4 (87.9, 93.9)	71.0 (64.1, 76.9)
Instability/ Dislocation	73	357	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	99.7 (97.9, 100.0)	96.2 (93.4, 97.8)	92.9 (89.4, 95.3)	76.9 (70.6, 82.1)
Loosening	53	355	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	99.4 (97.5, 99.8)	96.4 (93.4, 98.0)	91.5 (87.2, 94.4)	79.6 (72.7, 84.9)
Infection	21	116	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	98.2 (93.2, 99.6)	94.4 (87.9, 97.5)	92.2 (85.0, 96.0)	
TOTAL	**223**	**1242**						

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR245 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Anatomic Shoulder Procedures since 1st Revised by Reason for 1st Revision (Excluding 1st Revision for Infection)

Type of 1st Revision	N Deceased	N Total	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	10 Yrs
Major Partial	175	820	99.9 (99.1, 100.0)	99.8 (99.0, 99.9)	99.0 (98.0, 99.5)	95.9 (94.3, 97.1)	91.9 (89.7, 93.7)	75.4 (71.5, 78.8)
Major Total	64	533	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	99.8 (98.6, 100.0)	96.5 (94.2, 97.9)	91.5 (88.1, 94.1)	77.2 (70.4, 82.6)
Minor	39	183	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	99.4 (96.1, 99.9)	95.8 (91.4, 98.0)	91.9 (86.5, 95.2)	78.0 (70.0, 84.1)
TOTAL	**278**	**1536**						

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

1st Revision of Total Stemmed Reverse Shoulder Replacement

The Registry has recorded 2,490 1st revision procedures of total stemmed reverse shoulder replacement for all diagnoses. There are 628 procedures excluded where the 1st revision was undertaken for infection. There are also 11 procedures excluded where minor or major shoulder prostheses were not inserted, and the diagnosis was not infection. Therefore, this analysis includes 1851 1st revision procedures of total stemmed reverse shoulder replacements.

DEMOGRAPHICS OF 1ST REVISION

The mean age for patients undergoing a 1st revision total stemmed reverse shoulder replacement is 73 years. 1st revision procedures are more common in males (50.1%), and the highest proportion of patients have an ASA score of 2 (26.4%) or 3 (66.1%) and have a BMI in the pre obese category (30.5%). Demographic details for the 1st revision of total stemmed reverse shoulder replacement procedures are shown in Table SSR246.

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Table SSR246 Summary of 1st Revision of Known Primary Total Stemmed Reverse Replacement (All Diagnoses, Excluding 1st Revisions for Infection)

Variable	Instability/ Dislocation (n=782)	Loosening (n= 406)	Fracture (n=273)	Rotator Cuff Insufficiency (n=9)	Other (n=381)	TOTAL (n=1,851)
Follow-up Years (Primary to 1st Revision)						
Mean (SD)	0.9 ± 1.7	2 ± 2.5	1.9 ± 2.6	1.9 ± 2.3	2.1 ± 2.4	1.5 ± 2.3
Median (IQR)	0.2 (0.1, 0.7)	1.1 (0.3, 2.8)	0.7 (0.2, 2.1)	1.2 (0.4, 2.5)	1.3 (0.5, 2.8)	0.5 (0.1, 1.9)
Minimum	0	0	0	0	0	0
Maximum	11.2	16.7	12.2	6.9	14.8	16.7
Age at 1st Revision						
Mean (SD)	71.7 ± 9.7	74.2 ± 8.4	75.9 ± 7.9	74.8 ± 9.4	72.5 ± 8.7	73 ± 9.1
Median (IQR)	72 (65, 78)	75 (69, 80)	76 (71, 82)	75 (68, 83)	73 (67, 78)	74 (67, 79)
Age at 1st Revision in groups						
<55	29 (3.7%)	6 (1.5%)	2 (0.7%)		12 (3.1%)	49 (2.6%)
55-64	144 (18.4%)	48 (11.8%)	22 (8.1%)	1 (11.1%)	51 (13.4%)	266 (14.4%)
65-74	289 (37%)	136 (33.5%)	89 (32.6%)	3 (33.3%)	152 (39.9%)	669 (36.1%)
≥75	320 (40.9%)	216 (53.2%)	160 (58.6%)	5 (55.6%)	166 (43.6%)	867 (46.8%)
Gender						
Male	471 (60.2%)	153 (37.7%)	98 (35.9%)	5 (55.6%)	201 (52.8%)	928 (50.1%)
Female	311 (39.8%)	253 (62.3%)	175 (64.1%)	4 (44.4%)	180 (47.2%)	923 (49.9%)
ASA at 1st Revision[1]						
ASA 1	11 (1.6%)	6 (1.7%)	5 (2.1%)	1 (14.3%)	5 (1.4%)	28 (1.7%)
ASA 2	163 (24%)	105 (29.2%)	61 (25.3%)	2 (28.6%)	99 (28.7%)	430 (26.4%)
ASA 3	467 (68.9%)	231 (64.3%)	147 (61%)	4 (57.1%)	228 (66.1%)	1,077 (66.1%)
ASA 4	37 (5.5%)	17 (4.7%)	28 (11.6%)		13 (3.8%)	95 (5.8%)
BMI at 1st Revision[2]						
Underweight	8 (1.4%)	4 (1.3%)	3 (1.5%)		4 (1.3%)	19 (1.3%)
Normal	93 (16.1%)	62 (19.6%)	42 (21.2%)	2 (28.6%)	67 (21.1%)	266 (18.8%)
Pre Obese	159 (27.5%)	104 (32.8%)	62 (31.3%)	1 (14.3%)	106 (33.3%)	432 (30.5%)
Obese Class 1	170 (29.4%)	93 (29.3%)	56 (28.3%)	2 (28.6%)	82 (25.8%)	403 (28.4%)
Obese Class 2	86 (14.9%)	31 (9.8%)	22 (11.1%)	2 (28.6%)	35 (11%)	176 (12.4%)

Obese Class 3	62 (10.7%)	23 (7.3%)	13 (6.6%)		24 (7.5%)	122 (8.6%)
Fixation of Primary Procedure						
Cemented	8 (1%)	4 (1%)	1 (0.4%)		2 (0.5%)	15 (0.8%)
Cementless	557 (71.2%)	322 (79.3%)	214 (78.4%)	7 (77.8%)	303 (79.5%)	1,403 (75.8%)
Hybrid	217 (27.7%)	80 (19.7%)	58 (21.2%)	2 (22.2%)	76 (19.9%)	433 (23.4%)
Glenoid Fixation in 1st Revision						
Glenoid Cemented		16 (3.9%)	1 (0.4%)		1 (0.3%)	18 (1%)
Glenoid Cementless	41 (5.2%)	133 (32.8%)	43 (15.8%)	6 (66.7%)	95 (24.9%)	318 (17.2%)
No Glenoid inserted in 1st Revision	741 (94.8%)	257 (63.3%)	229 (83.9%)	3 (33.3%)	285 (74.8%)	1,515 (81.8%)
Humeral Fixation in 1st Revision						
Humeral Cemented	58 (7.4%)	80 (19.7%)	99 (36.3%)	1 (11.1%)	33 (8.7%)	271 (14.6%)
Humeral Cementless	194 (24.8%)	72 (17.7%)	70 (25.6%)	6 (66.7%)	105 (27.6%)	447 (24.1%)
No Humeral component inserted in 1st Revision	530 (67.8%)	254 (62.6%)	104 (38.1%)	2 (22.2%)	243 (63.8%)	1,133 (61.2%)

Abbreviations: SD - standard deviation, IQR - interquartile range, ASA - American Society of Anesthesiologists, BMI - Body Mass Index (kg/m^2)

[1]Excludes 221 procedures with unknown ASA at the1st Revision

[2]Excludes 433 procedures with unknown BMI at the 1st Revision

OUTCOME OF 1ST REVISION

There are 366 2nd revisions of the 1,851 1st revision procedures, and the cumulative percent 2nd revision at 10 years is 25.6% (Table SSR247 and Figure SSR181).

The most common reasons for 2nd revision are instability/dislocation (45.6%), infection (19.1%), loosening (18%), and fracture (5.2%) (Table SSR248 and Figure SSR182).

Isolated revision of the humeral component is the most common 2nd revision procedure (25.4%), followed by humeral and glenoid revision (17.8%), cup and head (16.1%), glenoid only (10.7%), and head only (10.1%) (Table SSR249).

Primary total stemmed reverse shoulder replacement implants may encompass a single design platform prosthesis (SDPP). These platform implants range include both anatomic and reverse shoulder replacement. They feature common design, composition metallurgy, coatings, and bearing surfaces. They allow polarity change of humeral or glenoid prostheses by modular exchange. In revision surgery, the humeral stem may be retained if a SDPP was used in the primary procedure. In the first two weeks following the 1st revision, procedures that retain the humeral stem have a higher rate of 2nd revision compared to procedures that do not retain the humeral stem. After this time, there is no difference (Table SSR250 and Figure SSR183).

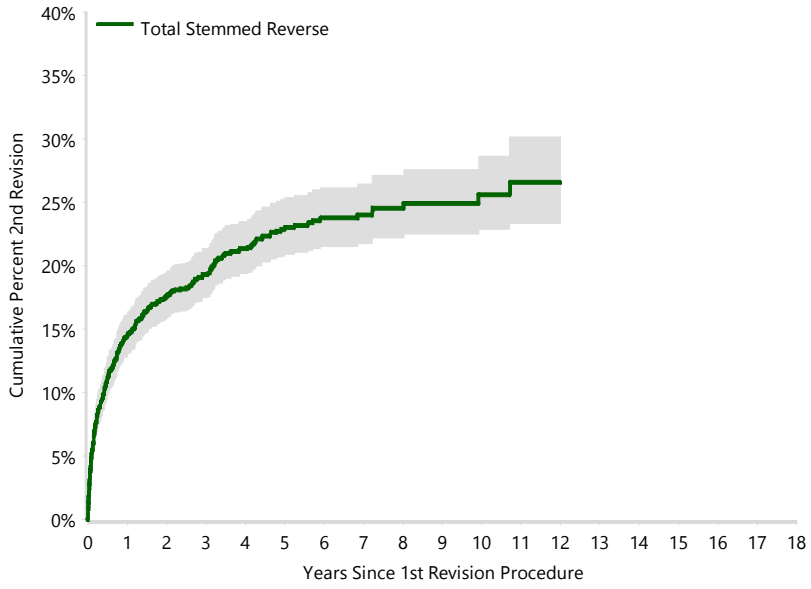
At 10 years, the cumulative percent 2nd revision for known primary total stemmed reverse replacement is 25.6%.

Table SSR247 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement (All Diagnoses, Excluding 1st Revision for Infection)

Revision of Primary	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Total Stemmed Reverse	366	1851	14.5 (12.9, 16.2)	19.3 (17.5, 21.4)	22.9 (20.8, 25.2)	24.0 (21.8, 26.5)	25.6 (22.9, 28.6)
TOTAL	**366**	**1851**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR181 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Total Stemmed Reverse	1851	1327	860	519	292	105

Table SSR248 **Revision Diagnosis of 2nd Revision of Known Primary Total Stemmed Reverse Replacement (All Diagnoses, Excluding 1st Revision for Infection)**

2nd Revision Diagnosis	Number	Percent
Instability/Dislocation	167	45.6
Infection	70	19.1
Loosening	66	18.0
Fracture	19	5.2
Dissociation	14	3.8
Pain	7	1.9
Implant Breakage Humeral	3	0.8
Glenoid Erosion	3	0.8
Metal Related Pathology	3	0.8
Malposition	2	0.5
Rotator Cuff Insufficiency	2	0.5
Lysis	2	0.5
Wear Humeral Cup	1	0.3
Implant Breakage Glenoid Insert	1	0.3
Arthrofibrosis	1	0.3
Implant Breakage Head	1	0.3
Incorrect Sizing	1	0.3
Other	3	0.8
TOTAL	**366**	**100.0**

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR249 **Type of Revision of 2nd Revision of Known Primary Total Stemmed Reverse Replacement (All Diagnoses, Excluding 1st Revision for Infection)**

Type of 2nd Revision	Number	Percent
Humeral Component	93	25.4
Humeral/Glenoid	65	17.8
Cup/Head	59	16.1
Glenoid Component	39	10.7
Head Only	37	10.1
Cup Only	30	8.2
Cement Spacer	25	6.8
Removal of Prostheses	9	2.5
Head/Insert	3	0.8
Minor Components	3	0.8
Cement Only	2	0.5
Reoperation	1	0.3
TOTAL	**366**	**100.0**

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted

Figure SSR182 **Cumulative Incidence 2nd Revision Diagnosis of Known Primary Total Stemmed Reverse Replacement (All Diagnoses, Excluding 1st Revision for Infection)**

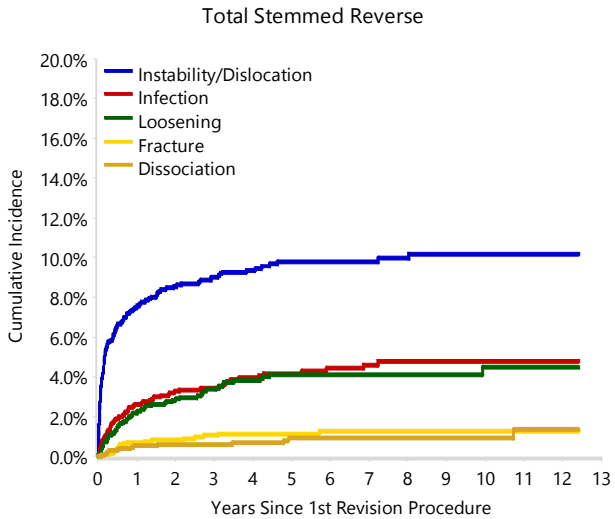
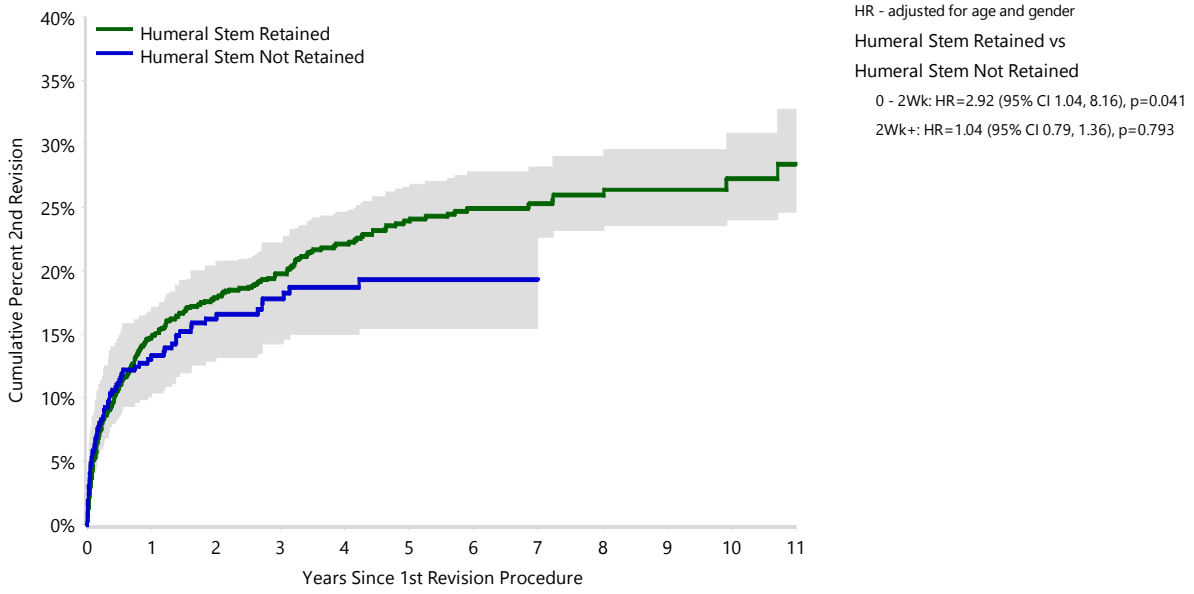


Table SSR250 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Humeral Retention (All Diagnoses, Excluding 1st Revision for Infection and Removal of Prosthesis Only Revision)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Humeral Stem Retained	292	1416	14.7 (12.9, 16.7)	19.8 (17.6, 22.1)	23.9 (21.4, 26.6)	25.3 (22.6, 28.2)	27.3 (24.0, 30.8)
Humeral Stem Not Retained	70	414	13.3 (10.4, 17.1)	17.8 (14.2, 22.2)	19.4 (15.5, 24.1)	19.4 (15.5, 24.1)	
TOTAL	**362**	**1830**					

Figure SSR183 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Humeral Retention (All Diagnoses, Excluding 1st Revision for Infection and Removal of Prosthesis Only Revision)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Humeral Stem Retained	1416	1021	661	409	230	85
Humeral Stem Not Retained	414	293	188	100	58	20

OUTCOME OF 1ST REVISION BY CLASS OF REVISION

Minor revision is the most common class of 1st revision procedure of a primary total stemmed reverse shoulder replacement (51.6%), followed by major partial (39.6%) and then major total revision (8.8%). Since 2006, there has been an ongoing increase in the proportion of major partial 1st revisions with a corresponding reduction in the proportion of minor 1st revisions (Figure SSR184).

When the outcomes of the 1st revision by class of 1st revision are compared, there is no difference in the rate of 2nd revision (Table SSR251 and Figure SSR185).

All classes of 1st revision undergo 2nd revision predominately for instability/dislocation (Figure SSR186).

When comparing 1st revision outcomes by class, the rate of 2nd revision does not vary.

Figure SSR184 **Revision Shoulder Replacement by Class of 1st Revision (Primary Total Stemmed Reverse Shoulder Replacement)**

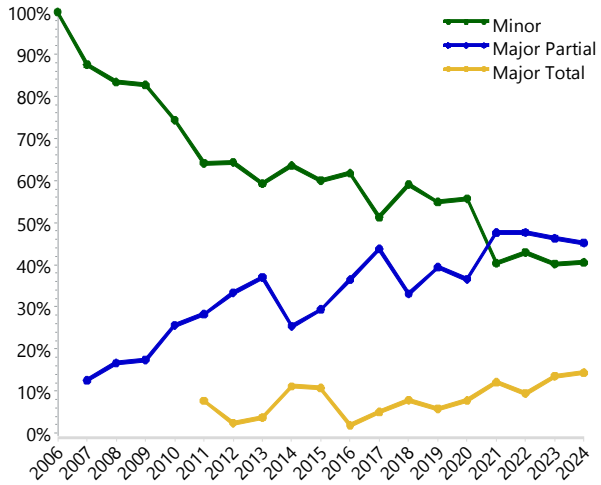
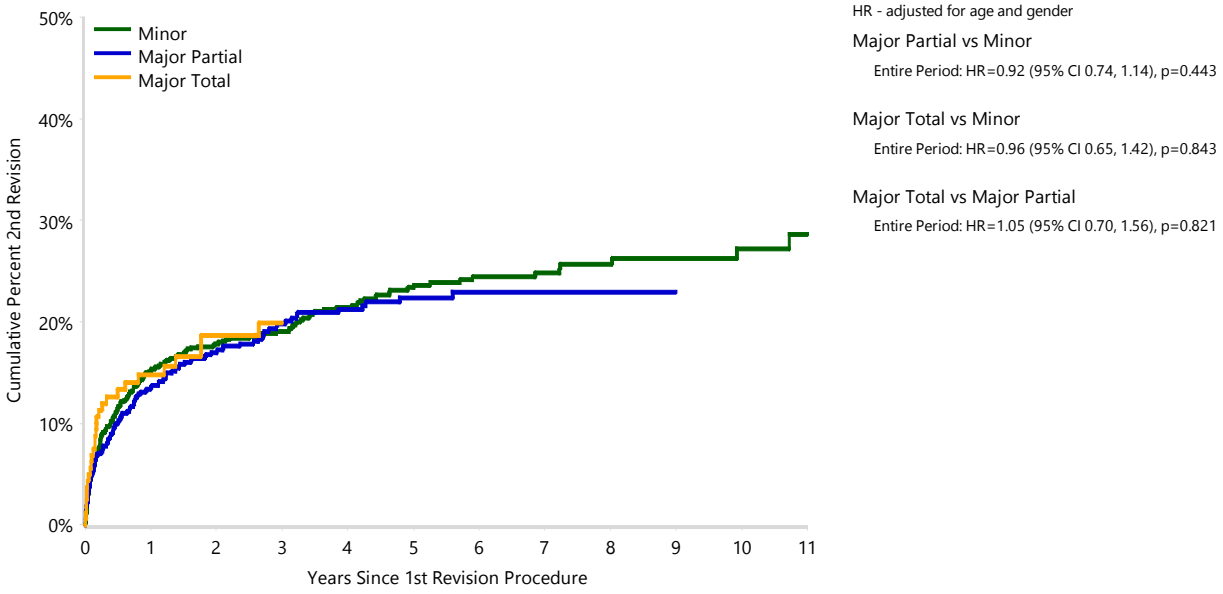


Table SSR251 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Class of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Minor	202	956	15.1 (12.9, 17.6)	19.0 (16.6, 21.8)	23.4 (20.5, 26.6)	24.8 (21.8, 28.2)	27.2 (23.4, 31.5)
Major Partial	135	733	13.6 (11.2, 16.4)	19.8 (16.8, 23.2)	22.4 (19.0, 26.2)	23.0 (19.5, 26.9)	
Major Total	29	162	14.8 (10.1, 21.5)	19.9 (14.0, 27.8)			
TOTAL	**366**	**1851**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

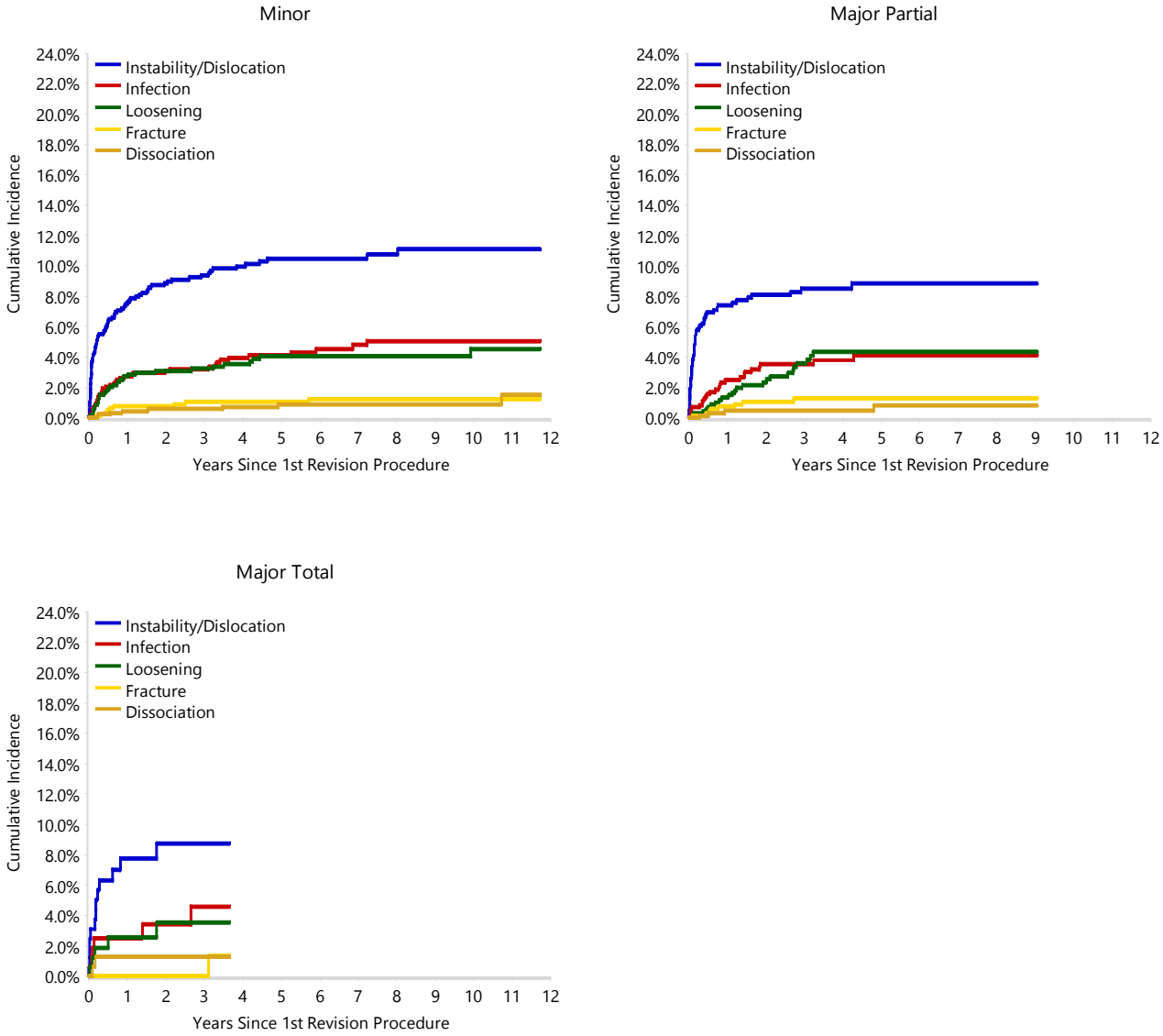
Figure SSR185 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Minor	956	703	496	320	186	70
Major Partial	733	519	305	171	89	29
Major Total	162	105	59	28	17	6

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR186 Cumulative Incidence 2nd Revision Diagnosis of Known Primary Total Stemmed Reverse Replacement by Class of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



OUTCOME OF 1ST REVISION BY TYPE OF REVISION

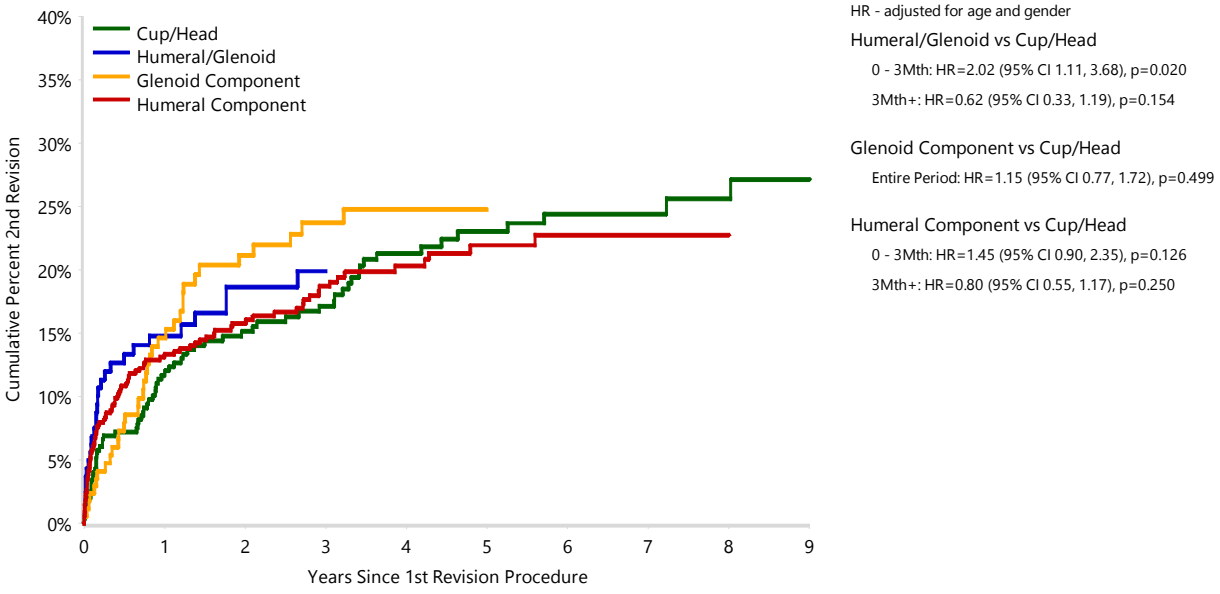
The most common type of 1st revision of a total stemmed reverse is of the humeral component followed by a cup and head exchange.

A humeral/glenoid 1st revision has a higher rate of 2nd revision than head and cup revisions in the first 3 months, but no difference after that time. There is no difference in the rate of 2nd revision between other 1st revision combinations (Table SSR252 and Figure SSR187).

Table SSR252 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Cup/Head	71	350	11.7 (8.7, 15.7)	17.2 (13.4, 21.9)	23.0 (18.4, 28.6)	24.4 (19.6, 30.3)
Humeral/Glenoid	29	162	14.8 (10.1, 21.5)	19.9 (14.0, 27.8)		
Glenoid Component	36	172	14.6 (10.0, 21.2)	23.7 (17.6, 31.6)	24.7 (18.4, 32.8)	
Humeral Component	99	557	13.3 (10.7, 16.5)	18.7 (15.4, 22.6)	21.9 (18.1, 26.5)	22.8 (18.7, 27.6)
TOTAL	**235**	**1241**				

Figure SSR187 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Cup/Head	350	270	188	119	67	34
Humeral/Glenoid	162	105	59	28	17	6
Glenoid Component	172	123	79	49	22	6
Humeral Component	557	393	223	119	65	23

HUMERAL FIXATION OUTCOME

Total stemmed reverse shoulder replacements are the most commonly revised without exchange of the humeral component in the 1st revision.

There is no difference in the rate of 2nd revision of total stemmed reverse shoulder replacements when cemented or cementless humeral components are revised in the 1st revision compared to procedures with no exchange of the humeral component (Table SSR253).

Table SSR253 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Humeral Fixation of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Humeral Fixation in 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Humeral Cemented	51	271	13.8 (10.1, 18.6)	19.9 (15.2, 25.8)	22.4 (17.2, 29.0)	
Humeral Cementless	77	447	13.6 (10.7, 17.3)	18.5 (14.8, 22.9)	21.6 (17.3, 26.8)	22.5 (17.9, 28.0)
No Humeral Component Inserted in 1st Revision	238	1133	14.9 (12.9, 17.2)	19.6 (17.3, 22.2)	23.5 (20.8, 26.4)	24.7 (21.9, 27.8)
TOTAL	**366**	**1851**				

Note: Excluding 1st revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

TIMING OF 1ST REVISION

The timing of the 1st revision was classified as early if it occurred within 2 years of the primary procedure (<2 years) or late if it occurred 2 years or more (≥2 years) after the primary procedure.

There are 1,412 early 1st revisions (76.3%). Diagnoses and timing of 1st revisions of primary total stemmed reverse shoulder replacements are shown in Table SSR255.

1st revisions performed within 2 years have a higher rate of 2nd revision in the first 2 weeks when compared to late 1st revisions and do not differ after that time (Table SSR254 and Figure SSR188).

There are 276 early 1st revisions for loosening (68%). These early revisions have a higher rate of 2nd revision compared to those performed later (Table SSR256 and Figure SSR189).

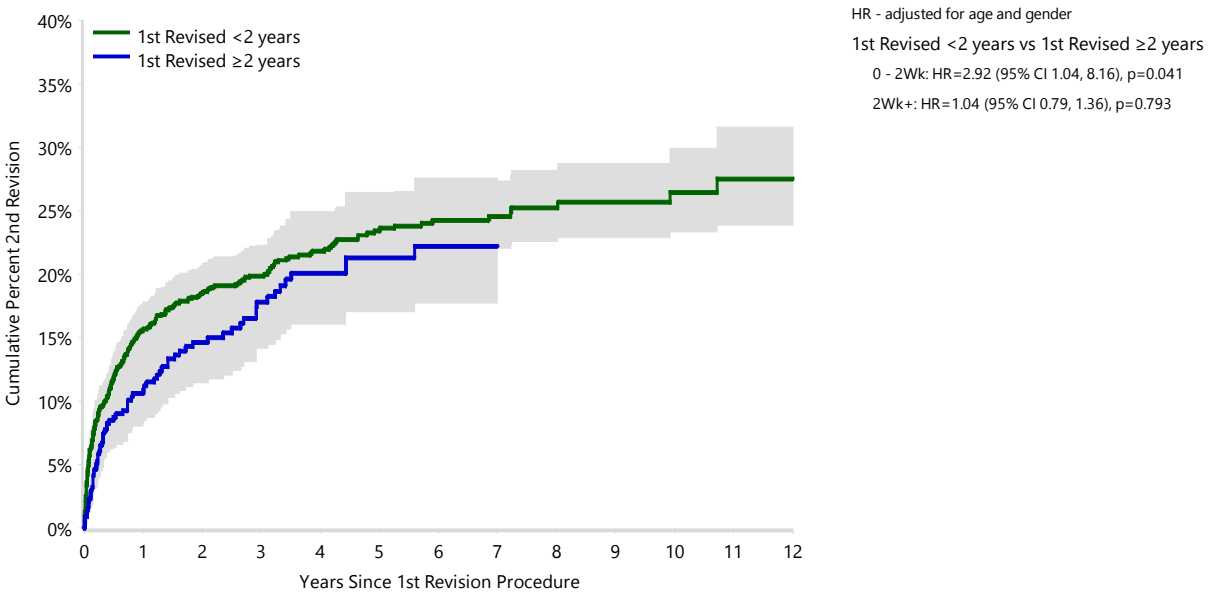
There are 681 early 1st revisions for dislocation/instability (87.1%). There is no difference in the rate of 2nd revision comparing early or late 1st revisions performed for dislocation/ instability (Table SSR257).

There are 198 early 1st revisions for fracture (72.5%). There is no difference in 2nd revision rates comparing early and late 1st revisions performed for fracture (Table SSR258).

Table SSR254 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Timing of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Timing of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised <2 years	293	1412	15.6 (13.8, 17.7)	19.9 (17.8, 22.2)	23.4 (21.0, 26.1)	24.6 (22.0, 27.4)	26.5 (23.4, 29.9)
1st Revised ≥2 years	73	439	10.6 (8.0, 14.0)	17.8 (14.1, 22.3)	21.3 (17.1, 26.4)	22.2 (17.7, 27.6)	
TOTAL	**366**	**1851**					

Figure SSR188 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Timing of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised <2 years	1412	1017	666	412	238	92
1st Revised ≥2 years	439	310	194	107	54	13

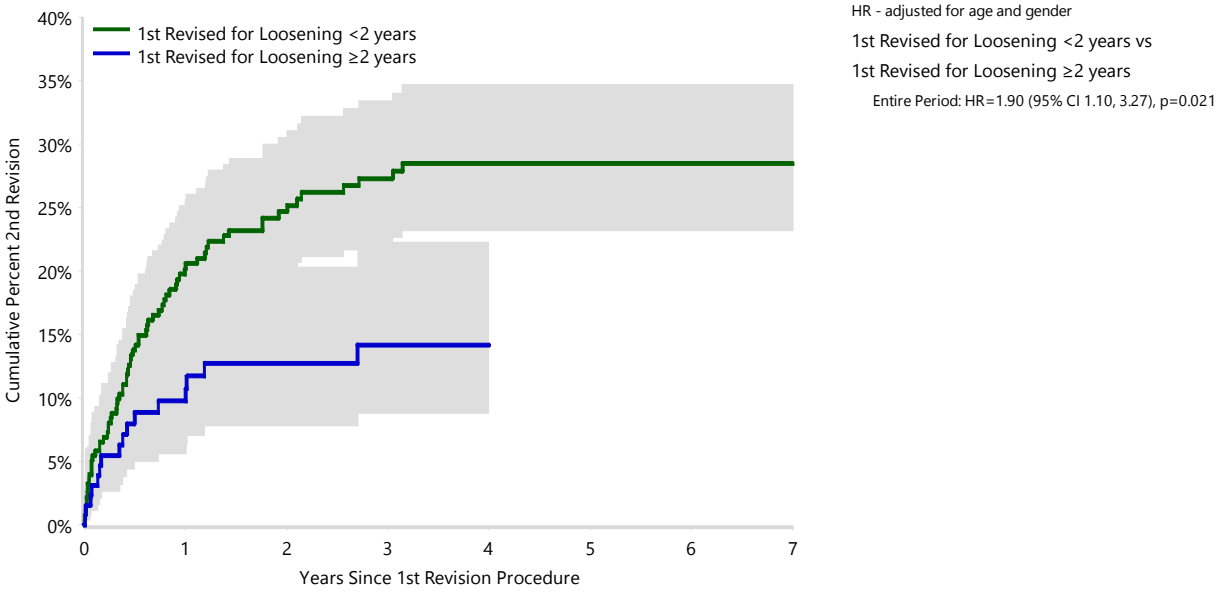
Table SSR255 Known Primary Total Stemmed Reverse Shoulder by Timing and Reason of 1st Revision (Excluding 1st Revision for Infection)

Revision of 1st Revision	1st Revised <2 years			1st Revised ≥2 years			TOTAL		
	N	Row%	Col%	N	Row%	Col%	N	Row%	Col%
Arthrofibrosis	20	71.4	1.4	8	28.6	1.8	28	100.0	1.5
Dissociation	71	79.8	5.0	18	20.2	4.1	89	100.0	4.8
Fracture	198	72.5	14.0	75	27.5	17.1	273	100.0	14.7
Glenoid Erosion	2	100.0	0.1	.	.	.	2	100.0	0.1
Heterotopic Bone	7	58.3	0.5	5	41.7	1.1	12	100.0	0.6
Implant Breakage Glenoid	13	68.4	0.9	6	31.6	1.4	19	100.0	1.0
Implant Breakage Glenoid Insert	1	25.0	0.1	3	75.0	0.7	4	100.0	0.2
Implant Breakage Humeral	3	50.0	0.2	3	50.0	0.7	6	100.0	0.3
Incorrect Sizing	14	82.4	1.0	3	17.6	0.7	17	100.0	0.9
Instability/Dislocation	681	87.1	48.2	101	12.9	23.0	782	100.0	42.2
Loosening	276	68.0	19.5	130	32.0	29.6	406	100.0	21.9
Lysis	11	36.7	0.8	19	63.3	4.3	30	100.0	1.6
Malposition	24	92.3	1.7	2	7.7	0.5	26	100.0	1.4
Metal Related Pathology	6	46.2	0.4	7	53.8	1.6	13	100.0	0.7
Pain	31	63.3	2.2	18	36.7	4.1	49	100.0	2.6
Rotator Cuff Insufficiency	6	66.7	0.4	3	33.3	0.7	9	100.0	0.5
Synovitis	.	.	.	1	100.0	0.2	1	100.0	0.1
Tumour	3	60.0	0.2	2	40.0	0.5	5	100.0	0.3
Wear Glenoid Insert	.	.	.	2	100.0	0.5	2	100.0	0.1
Wear Humeral Cup	.	.	.	9	100.0	2.1	9	100.0	0.5
Other	45	65.2	3.2	24	34.8	5.5	69	100.0	3.7
TOTAL	**1412**	**76.3**	**100.0**	**439**	**23.7**	**100.0**	**1851**	**100.0**	**100.0**

Table SSR256 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Timing of 1st Revision (All Diagnoses, 1st Revision for Loosening)

Timing of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
1st Revised for Loosening <2 years	70	276	20.2 (15.8, 25.6)	27.3 (22.1, 33.4)	28.5 (23.2, 34.7)	28.5 (23.2, 34.7)
1st Revised for Loosening ≥2 years	16	130	9.8 (5.7, 16.6)	14.2 (8.8, 22.3)		
TOTAL	**86**	**406**				

Figure SSR189 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Timing of 1st Revision (All Diagnoses, 1st Revision for Loosening)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs
1st Revised for Loosening <2 years	276	193	128	76	52
1st Revised for Loosening ≥2 years	130	92	55	32	18

Table SSR257 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Timing of 1st Revision (All Diagnoses, 1st Revision for Instability/Dislocation)

Timing of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revised for Dislocation/Instability <2 years	164	681	17.6 (14.9, 20.8)	21.9 (18.9, 25.4)	26.3 (22.7, 30.3)	28.5 (24.6, 32.9)	32.0 (27.0, 37.6)
1st Revised for Dislocation/Instability ≥2 years	22	101	15.1 (9.2, 24.3)	22.8 (15.0, 33.8)			
TOTAL	**186**	**782**					

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report

Table SSR258 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Timing of 1st Revision (All Diagnoses, 1st Revision for Fracture)

Timing of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
1st Revised for Fracture <2 years	25	198	10.0 (6.5, 15.3)	12.1 (8.1, 17.8)	14.4 (9.7, 21.2)	
1st Revised for Fracture ≥2 years	9	75	11.2 (5.8, 21.2)	13.0 (6.9, 23.6)	13.0 (6.9, 23.6)	13.0 (6.9, 23.6)
TOTAL	**34**	**273**				

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report

OUTCOME OF 1ST REVISION BY PATIENT CHARACTERISTICS

The outcome of the 1st revision of a primary total stemmed reverse shoulder replacement varies by age and gender, with females aged <65 years having a higher rate of 2nd revision than females aged ≥65 years.

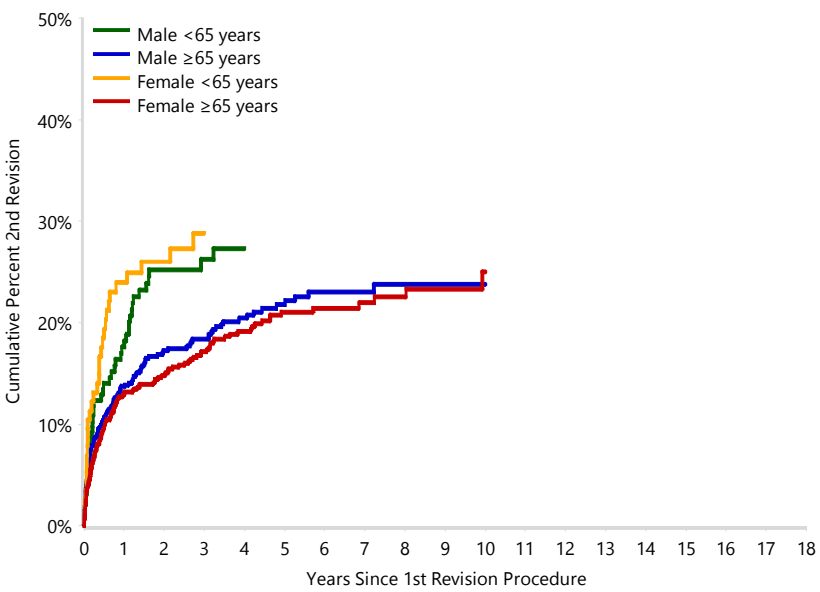
In males, the 2nd revision rate does not differ by age or when compared to females in the same age group (Table SSR259 and Figure SSR190).

Table SSR259 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Gender and Age (All Diagnoses, Excluding 1st Revision for Infection)

Gender	Age at 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Male	<65 years	48	199	17.6 (12.8, 23.9)	26.2 (20.2, 33.6)			
	≥65 years	138	729	13.7 (11.4, 16.5)	18.4 (15.6, 21.6)	21.8 (18.5, 25.5)	23.0 (19.6, 26.9)	23.8 (20.1, 28.0)
Female	<65 years	34	116	23.9 (17.1, 33.0)	28.8 (21.1, 38.6)			
	≥65 years	146	807	13.0 (10.8, 15.6)	17.1 (14.5, 20.1)	21.1 (18.0, 24.6)	22.0 (18.7, 25.7)	25.0 (20.4, 30.4)
TOTAL		**366**	**1851**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR190 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Gender and Age (All Diagnoses, Excluding 1st Revision for Infection)



Male <65 years vs Male ≥65 years
Entire Period: HR=1.36 (95% CI 0.98, 1.88), p=0.069

Male <65 years vs Female <65 years
Entire Period: HR=0.83 (95% CI 0.54, 1.29), p=0.408

Male ≥65 years vs Female ≥65 years
Entire Period: HR=1.09 (95% CI 0.86, 1.37), p=0.472

Female <65 years vs Female ≥65 years
Entire Period: HR=1.78 (95% CI 1.22, 2.58), p=0.002

Number at Risk		0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Male	<65 years	199	134	71	37	24	9
	≥65 years	729	522	337	202	105	43
Female	<65 years	116	78	43	29	18	8
	≥65 years	807	593	409	251	145	45

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

ASA SCORE AND BMI CATEGORY

ASA score is available for 1,630 1st revision total stemmed reverse shoulder replacements. There is no difference in the rate of 2nd revision between patients of ASA scores 1-4 (Table SSR260).

BMI is recorded for 1,418 1st revision procedures. The rate of 2nd revision does not differ between BMI classes (Table SSR261).

Table SSR260 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by ASA (All Diagnoses, Excluding 1st Revision for Infection)

ASA Grade	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
ASA 1	7	28	15.6 (6.1, 36.3)	26.4 (12.5, 50.5)	26.4 (12.5, 50.5)	
ASA 2	110	430	18.1 (14.7, 22.2)	26.6 (22.3, 31.5)	29.7 (25.1, 34.9)	30.4 (25.6, 35.7)
ASA 3	197	1077	14.6 (12.6, 16.9)	18.4 (16.1, 21.0)	21.7 (18.9, 24.7)	23.1 (20.0, 26.6)
ASA 4	6	95	5.7 (2.4, 13.2)	7.2 (3.3, 15.4)	7.2 (3.3, 15.4)	
TOTAL	**320**	**1630**				

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.
Excludes 221 procedures with no ASA recorded.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR261 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by BMI (All Diagnoses, Excluding 1st Revision for Infection)

BMI Category	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
Underweight	2	19	5.3 (0.8, 31.9)	5.3 (0.8, 31.9)	21.1 (4.8, 68.2)			
Normal	48	266	14.4 (10.6, 19.4)	16.5 (12.3, 21.8)	19.6 (14.9, 25.5)	21.0 (16.1, 27.2)	21.0 (16.1, 27.2)	
Pre Obese	84	432	15.5 (12.3, 19.5)	19.5 (15.9, 23.9)	20.3 (16.6, 24.8)	22.5 (18.3, 27.3)	23.2 (18.9, 28.3)	24.4 (19.7, 30.0)
Obese Class 1	85	403	16.0 (12.7, 20.1)	20.3 (16.5, 24.9)	22.4 (18.3, 27.2)	24.0 (19.7, 29.1)	25.4 (20.8, 30.9)	27.0 (21.7, 33.2)
Obese Class 2	36	176	17.5 (12.5, 24.3)	20.5 (15.0, 27.7)	21.5 (15.8, 28.9)	21.5 (15.8, 28.9)	24.8 (18.0, 33.4)	
Obese Class 3	22	122	13.6 (8.4, 21.6)	19.8 (13.1, 29.2)	21.4 (14.3, 31.3)			
TOTAL	**277**	**1418**						

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.
Excludes 433 procedures are excluded as BMI has not been recorded.
BMI has not been presented for patients aged ≤19 years.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

CHANGES IN REVISION SHOULDER SURGERY OVER TIME

The most common reason for 1st revision of total stemmed reverse shoulder replacements has changed over time. In 2008, loosening was more common than instability/dislocation, but after 2008, instability/dislocation predominated (Figure SSR191).

Up to 2020, the most common 1st revision of primary total stemmed reverse shoulder arthroplasty was a minor revision, but after that time, it was major partial revision.

In 2024, 45.1% of 1st revisions were major partial, 40.5% minor and 14.3% major total (Figure SSR184).

The type of fixation of the humeral component at 1st revision has remained predominately cementless when the humeral component was exchanged (Figure SSR192). The results of cemented or uncemented 1st revision humeral components are stratified by reason of 1st revision in the following section.

Figure SSR191 **Revision Shoulder Replacement by Reason for 1st Revision (Primary Total Stemmed Reverse Shoulder Replacement)**

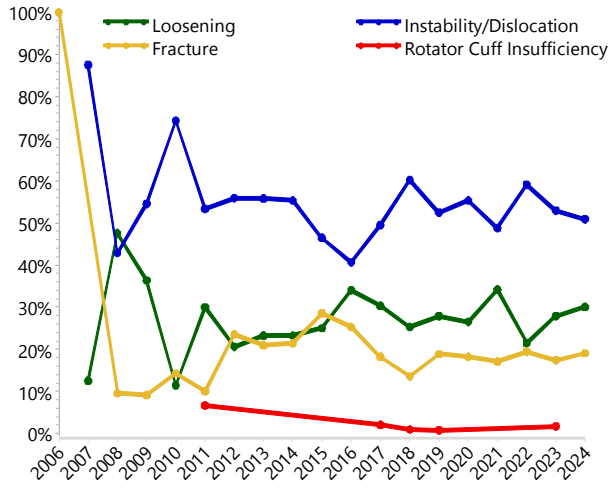
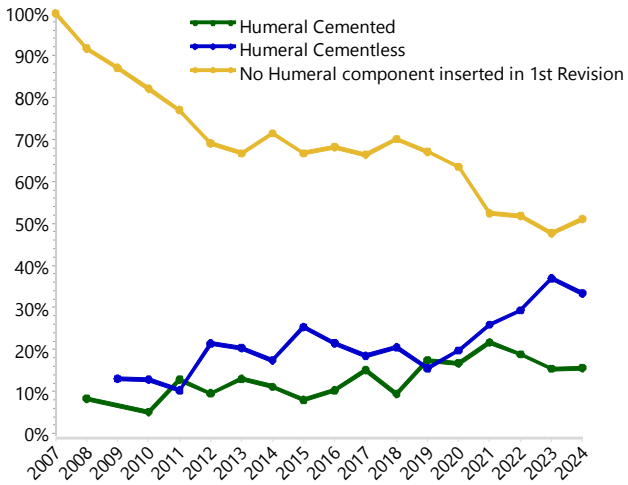


Figure SSR192 **Primary Known 1st Revision Shoulder Replacement by Humeral Fixation (All Diagnoses, Primary Class Total Stemmed Reverse, Excluding 1st Revision for Infection)**



OUTCOMES OF THE 1ST REVISION BY REASON FOR 1ST REVISION

Further analyses on the outcomes of the most common reasons for 1st revision have been performed. These include loosening, prosthesis dislocation/instability, fracture, and rotator cuff insufficiency.

When compared to fracture, loosening and prosthesis dislocation/instability and rotator cuff insufficiency have a higher rate of 2nd revision (Table SSR262 and Figure SSR193).

1st revision procedures for instability/ dislocation and loosening were predominately revised for the same reasons at 2nd revision. 1st revision procedures for rotator cuff insufficiency mainly underwent 2nd revision for loosening. 1st revision for fracture was most commonly revised for instability/dislocation (Table SSR263).

When there is a 1st revision for instability/dislocation or fracture, the most common 2nd revision was an isolated humeral revision. There was no predominate 2nd revision type for rotator cuff insufficiency (Table SSR264).

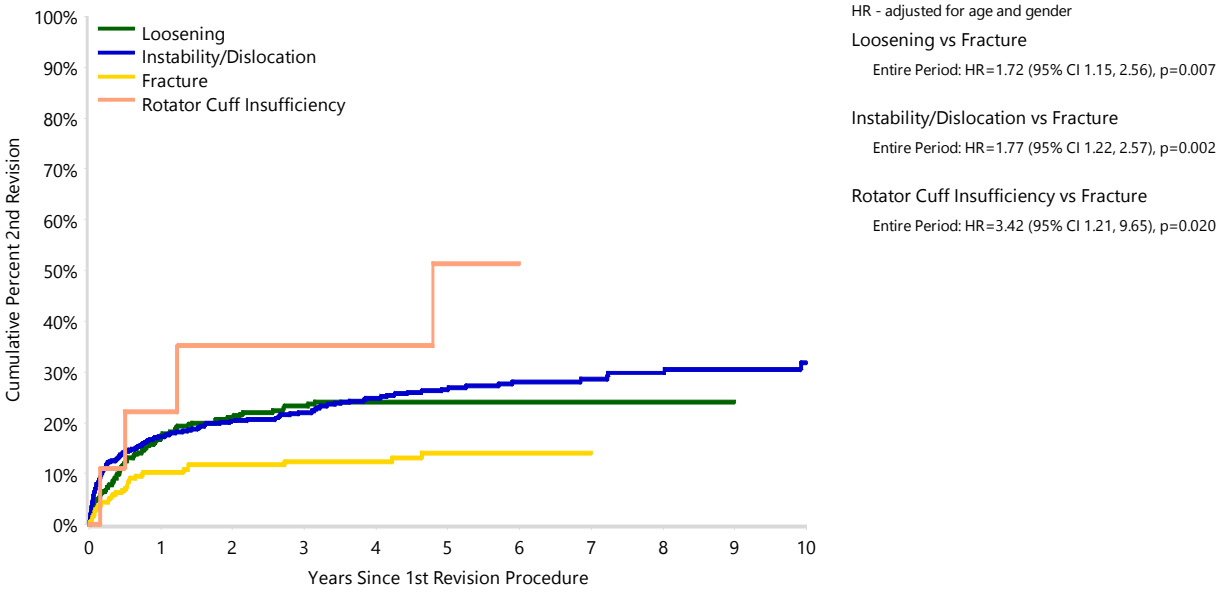
When compared to fracture, loosening and prosthesis dislocation/instability and rotator cuff insufficiency have a higher rate of 2nd revision.

Table SSR262 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Reason for 1st Revision (All Diagnoses)

Reason for 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Loosening	86	406	17.0 (13.6, 21.1)	23.3 (19.2, 28.1)	24.1 (19.9, 29.0)	24.1 (19.9, 29.0)	
Instability/Dislocation	186	782	17.3 (14.8, 20.2)	22.0 (19.1, 25.3)	26.6 (23.2, 30.4)	28.7 (25.0, 32.8)	31.9 (27.2, 37.1)
Fracture	34	273	10.4 (7.2, 14.8)	12.3 (8.8, 17.1)	14.1 (10.1, 19.6)	14.1 (10.1, 19.6)	
Rotator Cuff Insufficiency	4	9	22.2 (6.1, 63.5)	35.2 (12.8, 74.7)	51.4 (22.4, 87.2)		
TOTAL	**310**	**1470**					

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR193 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Reason for 1st Revision (All Diagnoses)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Loosening	406	285	183	108	70	26
Instability/Dislocation	782	545	352	221	124	53
Fracture	273	209	139	82	49	8
Rotator Cuff Insufficiency	9	7	4	3	1	0

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR263 Revision Diagnosis of 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Reason for 1st Revision (All Diagnoses)

2nd Revision Diagnosis	Loosening		Instability/ Dislocation		Fracture		Rotator Cuff Insufficiency		TOTAL	
	N	Col%	N	Col%	N	Col%	N	Col%	N	Col%
Instability/Dislocation	18	20.9	125	67.2	11	32.4	.	.	154	49.7
Loosening	35	40.7	15	8.1	5	14.7	2	50.0	57	18.4
Infection	24	27.9	27	14.5	5	14.7	.	.	56	18.1
Fracture	3	3.5	5	2.7	10	29.4	.	.	18	5.8
Dissociation	1	1.2	7	3.8	.	.	1	25.0	9	2.9
Pain	2	2.3	.	.	1	2.9	.	.	3	1.0
Malposition	.	.	1	0.5	.	.	1	25.0	2	0.6
Glenoid Erosion	.	.	1	0.5	1	2.9	.	.	2	0.6
Lysis	2	2.3	.	.	.	.	.	.	2	0.6
Metal Related Pathology	.	.	2	1.1	.	.	.	.	2	0.6
Implant Breakage Glenoid Insert	.	.	1	0.5	.	.	.	.	1	0.3
Arthrofibrosis	.	.	1	0.5	.	.	.	.	1	0.3
Implant Breakage Humeral	.	.	1	0.5	.	.	.	.	1	0.3
Other	1	1.2	.	.	1	2.9	.	.	2	0.6
TOTAL	**86**	**100.0**	**186**	**100.0**	**34**	**100.0**	**4**	**100.0**	**310**	**100.0**

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Table SSR264 Type of 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (Primary Diagnosis OA)

Type of 2nd Revision	Loosening		Instability/ Dislocation		Fracture		Rotator Cuff Insufficiency		TOTAL	
	N	Col%	N	Col%	N	Col%	N	Col%	N	Col%
Humeral Component	15	17.4	56	30.1	7	20.6	1	25.0	79	25.5
Cup/Head	9	10.5	39	21.0	4	11.8	1	25.0	53	17.1
Humeral/Glenoid	25	29.1	19	10.2	5	14.7	1	25.0	50	16.1
Head Only	8	9.3	20	10.8	5	14.7	.	.	33	10.6
Glenoid Component	12	14.0	10	5.4	6	17.6	1	25.0	29	9.4
Cup Only	3	3.5	20	10.8	3	8.8	.	.	26	8.4
Cement Spacer	12	14.0	10	5.4	.	.	.	.	22	7.1
Removal of Prostheses	1	1.2	6	3.2	2	5.9	.	.	9	2.9
Head/Insert	.	.	2	1.1	1	2.9	.	.	3	1.0
Minor Components	.	.	2	1.1	1	2.9	.	.	3	1.0
Cement Only	.	.	2	1.1	.	.	.	.	2	0.6
Reoperation	1	1.2	.	.	.	.	.	.	1	0.3
TOTAL	**86**	**100.0**	**186**	**100.0**	**34**	**100.0**	**4**	**100.0**	**310**	**100.0**

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

LOOSENING

Loosening is the most common 1st revision diagnosis for total stemmed reverse shoulder replacement. There are 260 1st revision total stemmed reverse shoulder replacement procedures for loosening, and 52 of these have had a 2nd revision.

The most common 1st revision for loosening is an isolated humeral revision, followed by isolated glenoid and humeral/glenoid revision.

Isolated glenoid 1st revisions have the highest number of 2nd revisions. Isolated glenoid 1st revisions have a higher rate of 2nd revision than humeral 1st revisions (Table SSR265 and Figure SSR194).

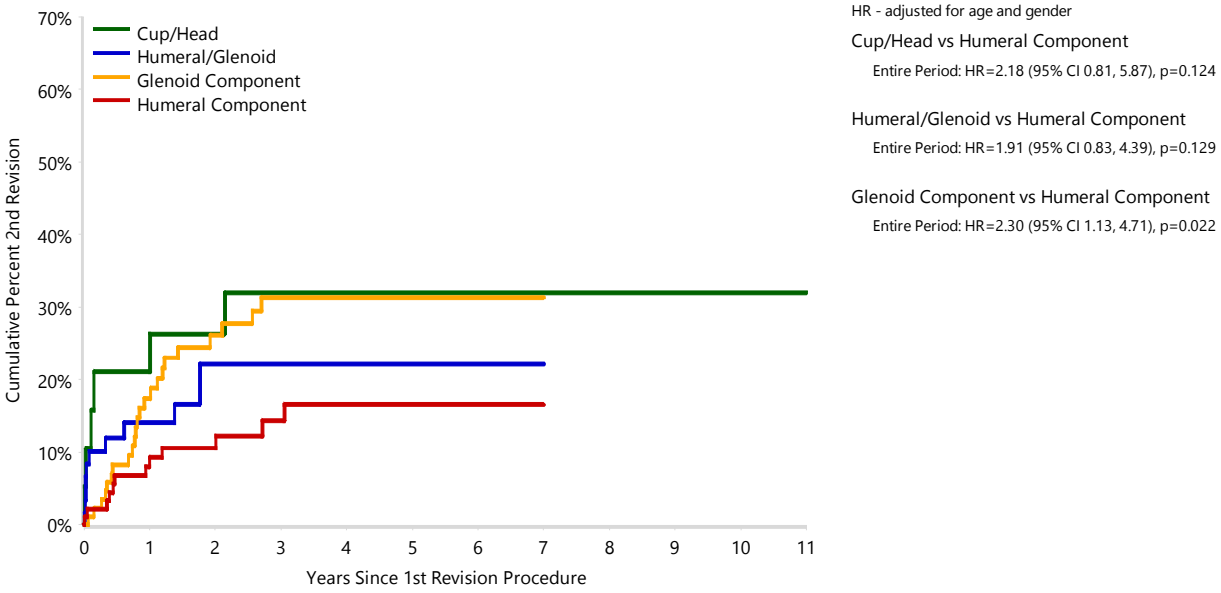
Where a 1st revision is performed for loosening and the humeral component is exchanged, the majority are cemented. There is a higher rate of 2nd revision where the exchanged humeral component in the 1st revision is cementless (Table SSR266 and Figure SSR195).

Table SSR265 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Loosening)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Cup/Head	6	19	21.1 (8.5, 46.8)	32.0 (15.8, 57.9)	32.0 (15.8, 57.9)	32.0 (15.8, 57.9)	32.0 (15.8, 57.9)
Humeral/Glenoid	11	60	14.1 (7.3, 26.3)	22.2 (12.7, 37.1)	22.2 (12.7, 37.1)	22.2 (12.7, 37.1)	
Glenoid Component	23	89	17.4 (10.7, 27.7)	31.3 (21.9, 43.6)	31.3 (21.9, 43.6)	31.3 (21.9, 43.6)	
Humeral Component	12	92	9.3 (4.7, 17.7)	14.3 (8.0, 24.7)	16.5 (9.5, 28.0)	16.5 (9.5, 28.0)	
TOTAL	**52**	**260**					

Note: Excludes 146 1st revisions with other revision types.

Figure SSR194 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Loosening)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Cup/Head	19	15	10	7	7	4
Humeral/Glenoid	60	38	22	10	7	2
Glenoid Component	89	61	37	22	12	4
Humeral Component	92	73	39	18	12	4

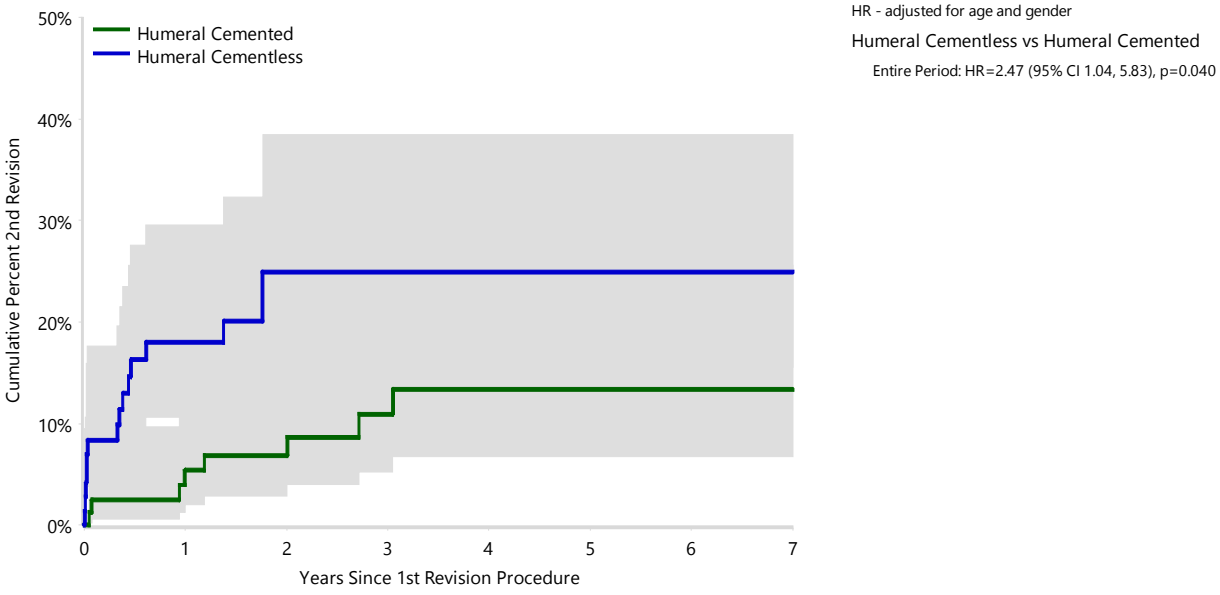
Note: Excludes 146 1st revisions with other revision types.

Table SSR266 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Humeral Fixation of 1st Revision (All Diagnoses, 1st Revision for Loosening)

Humeral Fixation in 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Humeral Cemented	8	80	5.4 (2.0, 13.7)	10.9 (5.3, 22.0)	13.3 (6.7, 25.5)	13.3 (6.7, 25.5)
Humeral Cementless	15	72	18.0 (10.6, 29.6)	24.9 (15.6, 38.5)	24.9 (15.6, 38.5)	24.9 (15.6, 38.5)
No Humeral component inserted in 1st Revision	63	254	20.3 (15.7, 25.9)	26.7 (21.4, 33.0)	27.3 (22.0, 33.7)	27.3 (22.0, 33.7)
TOTAL	**86**	**406**				

Note: Excludes 1st revisions where no minor or major humeral/glenoid components have been inserted.

Figure SSR195 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Humeral Fixation of 1st Revision (All Diagnoses, 1st Revision for Loosening)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs
Humeral Cemented	80	66	37	15	9
Humeral Cementless	72	45	24	13	10

DISLOCATION/INSTABILITY

Instability/dislocation is the second most common 1st revision diagnosis for total stemmed reverse shoulder replacement. There are 692 1st revision total stemmed reverse shoulder replacements for dislocation/instability, and 165 of these have had a 2nd revision.

The most common 1st revision for instability/dislocation is isolated humeral cup revision, followed by humeral revision.1st revision of humeral cup only has the highest number of 2nd revisions. There is no difference in the rate of 2nd revision between these types of 1st revision (Table SSR267).

Table SSR267 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Instability/Dislocation)

Type of 1st Revision	N Revised	N Total	1 Yr	2 Yrs	3 Yrs	5 Yrs	7 Yrs
Cup/Head	46	204	14.4 (10.1, 20.1)	17.3 (12.6, 23.5)	18.8 (13.8, 25.4)	24.1 (18.1, 31.7)	
Cup Only	65	264	16.4 (12.4, 21.6)	19.6 (15.2, 25.2)	21.2 (16.5, 26.9)	26.8 (21.2, 33.5)	29.3 (23.1, 36.7)
Humeral Component	54	224	20.4 (15.6, 26.4)	24.2 (18.9, 30.8)	26.0 (20.3, 32.9)	28.2 (22.0, 35.6)	
TOTAL	**165**	**692**					

Note: Excludes 90 1st revisions with other revision types.

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

FRACTURE

There are 244 primary total stemmed reverse shoulder replacements that have been revised for fracture, and 32 of these have had a 2nd revision.

The most common type of 1st revision for fracture is isolated humeral component revision, followed by head only revision. Humeral component only 1st revision has the highest number of 2nd revisions.

There is an increased rate of 2nd revision for isolated glenoid 1st revisions compared to humeral 1st revisions (Table SSR268 and Figure SSR196).

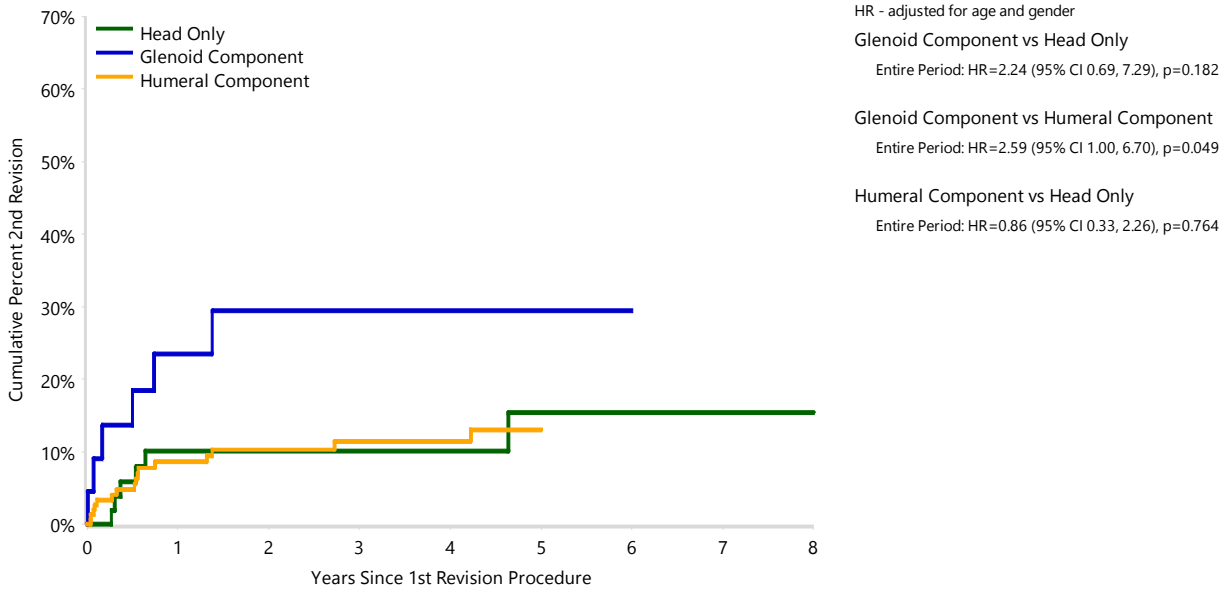
When 1st revision procedures are performed for fracture and the humeral component revised, cemented fixation predominates. There is no difference in the rate of 2nd revision comparing cemented versus cementless fixation of the humeral component used in the 1st revision (Table SSR269).

Table SSR268 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Fracture)

Type of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Head Only	6	52	10.1 (4.3, 22.6)	10.1 (4.3, 22.6)	15.4 (6.5, 33.8)	15.4 (6.5, 33.8)
Humeral/Glenoid	3	21	14.3 (4.8, 38.0)	14.3 (4.8, 38.0)	14.3 (4.8, 38.0)	14.3 (4.8, 38.0)
Glenoid Component	6	22	23.5 (10.5, 47.7)	29.4 (14.3, 54.5)	29.4 (14.3, 54.5)	
Humeral Component	17	149	8.6 (5.0, 14.7)	11.4 (7.0, 18.4)	13.0 (8.0, 20.9)	
TOTAL	**32**	**244**				

Note: Excludes 29 1st revisions with other revision types.

Figure SSR196 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Type of 1st Revision (All Diagnoses, 1st Revision for Fracture)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs
Head Only	52	42	27	16	13
Glenoid Component	22	14	9	7	3
Humeral Component	149	112	74	41	22

Table SSR269 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Humeral Fixation in 1st Revision (All Diagnoses, 1st Revision for Fracture)

Humeral Fixation in 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs
Humeral Cemented	15	99	11.4 (6.5, 19.7)	14.4 (8.5, 23.8)	17.0 (10.0, 28.0)	
Humeral Cementless	5	70	6.3 (2.4, 16.0)	8.2 (3.5, 18.7)	8.2 (3.5, 18.7)	8.2 (3.5, 18.7)
No Humeral component inserted in 1st Revision	14	104	11.9 (6.9, 20.0)	13.1 (7.8, 21.5)		
TOTAL	**34**	**273**				

Note: Excludes 1 humeral component revision with unknown fixation.

Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

OUTCOMES OF 1ST REVISION OVER TIME

This analysis compares the outcomes of 1st revisions of total stemmed reverse replacement over two successive time periods: pre 2016 and 2016–2024. There is no difference in the rate of 2nd revision of revised primary total stemmed reverse shoulder replacements when the two time periods are compared (Table SSR270).

There is no change in the rate of 2nd revision between pre-2016 and 2016-2024 for 2nd revision diagnoses of instability/dislocation, infection, loosening or fracture (Table SSR271 to Table SSR274).

Table SSR270 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	75	368	10.7 (7.9, 14.3)	14.2 (11.0, 18.2)	19.0 (15.2, 23.6)	19.7 (15.9, 24.4)	21.8 (17.6, 26.9)
2016-2024	291	1483	15.5 (13.7, 17.5)	20.8 (18.6, 23.1)	23.6 (21.2, 26.3)	25.3 (22.4, 28.5)	
TOTAL	**366**	**1851**					

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR271 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Dislocation/Instability)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	35	368	6.3 (4.2, 9.4)	8.2 (5.7, 11.6)	9.6 (6.9, 13.3)	9.6 (6.9, 13.3)	10.6 (7.7, 14.6)
2016-2024	132	1483	8.1 (6.7, 9.6)	9.7 (8.2, 11.5)	10.5 (8.9, 12.5)	10.5 (8.9, 12.5)	
TOTAL	**167**	**1851**					

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR272 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Infection)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	13	368	2.0 (1.0, 4.2)	2.3 (1.2, 4.6)	3.4 (1.9, 6.1)	3.9 (2.2, 6.7)	4.4 (2.5, 7.5)
2016-2024	57	1483	3.0 (2.2, 4.1)	4.3 (3.3, 5.7)	5.3 (4.0, 7.0)	6.6 (4.6, 9.5)	
TOTAL	**70**	**1851**					

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR273 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Loosening)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	15	368	1.5 (0.6, 3.6)	2.5 (1.3, 5.0)	4.0 (2.3, 6.9)	4.0 (2.3, 6.9)	4.9 (2.7, 8.6)
2016-2024	51	1483	2.6 (1.9, 3.6)	4.2 (3.2, 5.6)	5.0 (3.8, 6.7)	5.0 (3.8, 6.7)	
TOTAL	**66**	**1851**					

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR274 Cumulative Percent 2nd Revision of Known Primary Total Stemmed Reverse Replacement by Year of 1st Revision (All Diagnoses, Excluding 1st Revision for Infection, 2nd Revision for Fracture)

Year of 1st Revision	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Pre 2016	2	368	0.3 (0.0, 2.1)	0.3 (0.0, 2.1)	0.3 (0.0, 2.1)	0.7 (0.2, 3.1)	0.7 (0.2, 3.1)
2016-2024	17	1483	0.9 (0.5, 1.7)	1.6 (0.9, 2.6)	1.7 (1.1, 2.8)	1.7 (1.1, 2.8)	
TOTAL	**19**	**1851**					

Note: Excludes revisions where no minor or major humeral/glenoid components have been inserted.
Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

MORTALITY FOLLOWING THE 1ST REVISION

Mortality following a 1st revision of a primary total stemmed reverse shoulder replacement has been calculated for all 1st revision procedures and according to the more common 1st revision diagnoses.

The overall mortality is 0.2% at 30 days, 0.8% at 90 days, 3.3% at 1 year and 47.0% at 10 years (Table SSR275 and Figure SSR197).

There is no difference in mortality of 1st revision for total stemmed reverse shoulder replacements with respect to the 1st revision diagnosis or class of revision (Table SSR277 and Table SSR278).

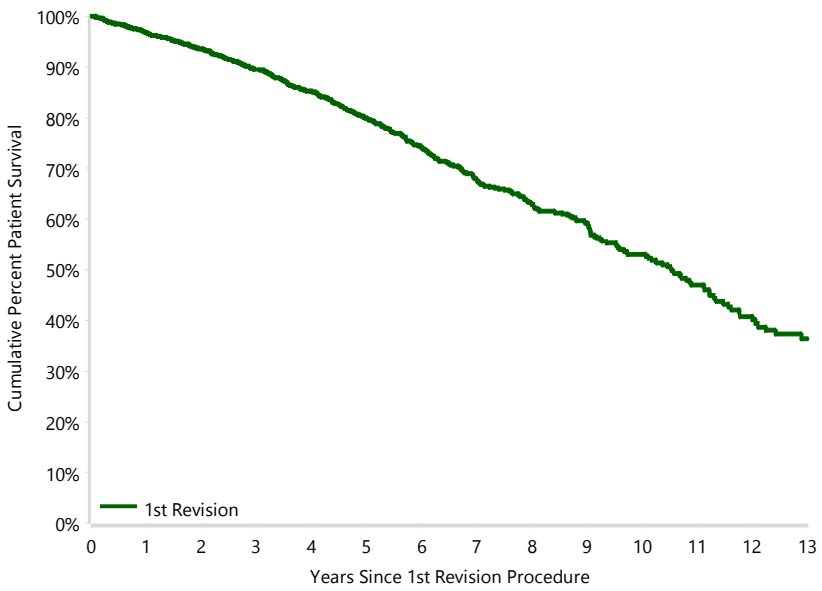
However, 1st revision total stemmed reverse shoulder replacements have a higher risk of mortality compared to unrevised primary total stemmed reverse patients (Table SSR276 and Figure SSR198).

The overall mortality is 0.2% at 30 days, 0.8% at 90 days, 3.3% at 1 year and 47.0% at 10 years.

Table SSR275 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Reverse Replacement since 1st Revised (Excluding 1st Revision for Infection)

1st Revision	N Deceased	N Total	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	10 Yrs
1st Revision	430	1806	99.8 (99.5, 99.9)	99.2 (98.7, 99.5)	96.7 (95.8, 97.5)	89.5 (87.8, 91.0)	79.8 (77.4, 82.1)	53.0 (48.7, 57.1)
TOTAL	**430**	**1806**						

Figure SSR197 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Reverse Replacement since 1st Revised (Excluding 1st Revision for Infection)



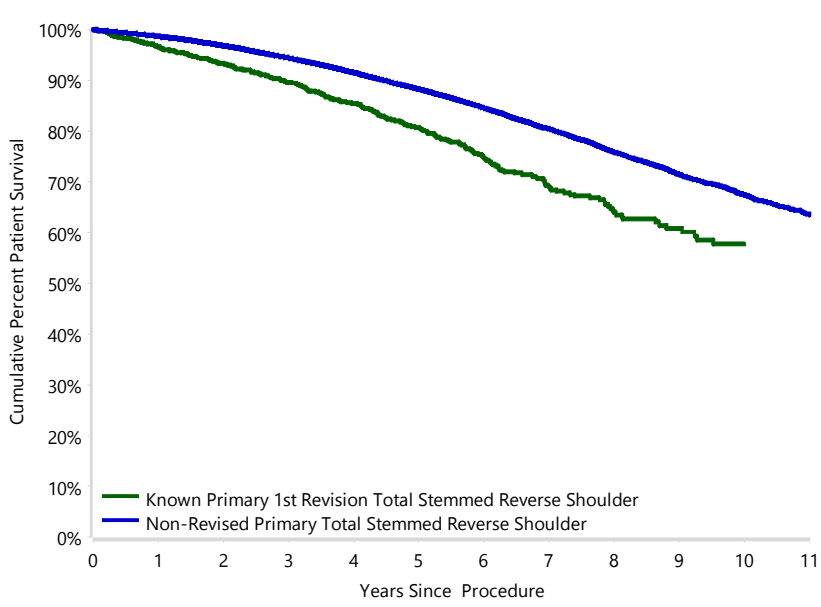
Number at Risk	0 Yr	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
1st Revision	1806	1781	1736	1526	1047	671	382	142

Table SSR276 Cumulative Percent Survival of Patients with Non-Revised Primary Total Stemmed Reverse Shoulder Replacement and Known Primary 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)

Procedure Type	N Deceased	N Total	1 Yr	5 Yrs	10 Yrs	15 Yrs
Known Primary 1st Revision Total Stemmed Reverse Shoulder	281	1587	96.6 (95.5, 97.4)	80.7 (78.0, 83.1)	57.7 (52.2, 62.9)	
Non-Revised Primary Total Stemmed Reverse Shoulder	6393	57513	98.7 (98.6, 98.8)	88.2 (87.9, 88.6)	67.4 (66.5, 68.4)	
TOTAL	**6674**	**59100**				

Note: Restricted to the first of the revision or primary procedures for bilateral patients in each procedure type with known age, sex and ASA score.
Time to survival is time from the primary procedure to death for the non-revised primary cohort and from the 1st revision procedure to death for the known primary 1st revision cohort

Figure SSR198 Cumulative Percent Survival of Patients with Non-Revised Primary Total Stemmed Reverse Shoulder Replacement and Known Primary 1st Revision (All Diagnoses, Excluding 1st Revision for Infection)



HR - adjusted for age, gender and ASA score at procedure

Known Primary 1st Revision Total Stemmed Reverse Shoulder VS Non-Revised Primary Total Stemmed Reverse Shoulder

Entire period: HR=1.52 (95% CI: 1.34, 1.71), P<0.0001

Number at Risk	0 Yr	1 Yr	5 Yrs	10 Yrs	15 Yrs
Known Primary 1st Revision Total Stemmed Reverse Shoulder	1587	1314	503	41	0
Non-Revised Primary Total Stemmed Reverse Shoulder	57513	48057	19542	1831	0

Note: Restricted to the first of the revision or primary procedures for bilateral patients in each procedure type with known age, sex and ASA score.
Time to survival is time from the primary procedure to death for the non-revised primary cohort and from the 1st revision procedure to death for the known primary 1st revision cohort

Table SSR277 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Reverse Replacement since 1st Revised by Reason for 1st Revision

Reason for 1st Revision	N Deceased	N Total	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	10 Yrs
Instability/Dislocation	182	765	99.9 (99.1, 100.0)	98.9 (97.9, 99.5)	96.0 (94.2, 97.2)	89.0 (86.3, 91.2)	81.6 (77.9, 84.7)	55.7 (49.3, 61.6)
Infection	107	617	99.7 (98.7, 99.9)	99.2 (98.0, 99.7)	97.2 (95.5, 98.3)	91.7 (88.8, 93.8)	83.6 (79.4, 87.1)	
Loosening	107	395	99.5 (98.0, 99.9)	99.2 (97.6, 99.8)	97.3 (95.0, 98.5)	87.7 (83.5, 90.9)	77.0 (71.4, 81.6)	
Fracture	70	267	100.0 (100.0, 100.0)	99.2 (97.0, 99.8)	97.3 (94.3, 98.7)	89.9 (85.0, 93.3)	76.2 (68.9, 82.0)	
TOTAL	**466**	**2044**						

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Table SSR278 Cumulative Percent Survival of Patients with Known Primary Total Stemmed Reverse Shoulder Procedures since 1st Revised by Type of 1st Revision (Excluding 1st Revision for Infection)

Type of 1st Revision	N Deceased	N Total	30 Days	90 Days	1 Yr	3 Yrs	5 Yrs	10 Yrs
Minor	269	933	99.9 (99.2, 100.0)	99.2 (98.4, 99.6)	96.8 (95.4, 97.8)	89.4 (87.0, 91.3)	78.9 (75.6, 81.8)	51.6 (46.3, 56.7)
Major Partial	140	716	99.9 (99.0, 100.0)	99.1 (98.1, 99.6)	96.4 (94.6, 97.6)	89.3 (86.4, 91.6)	80.9 (76.7, 84.4)	
Major Total	21	157	99.4 (95.5, 99.9)	99.4 (95.5, 99.9)	97.9 (93.5, 99.3)	91.6 (84.2, 95.6)		
TOTAL	**430**	**1806**						

Note: Figures (with sufficient revisions) are not shown where the results are not statistically significant (p >0.05); it is available in the Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report.

Prostheses with Higher than Anticipated Rates of Revision

Introduction

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

It is evident from Registry data that most prostheses have similar outcomes. However, a number have a rate of revision that is 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 rate of revision. In order to keep Registry data contemporaneous, only procedures using prostheses that have been available and used in 2024 (described as modern prostheses) are included as the comparator within the class. This is a more pragmatic approach than comparing to a select group of prostheses with the lowest rate of revision.

Stage 1

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 modern prostheses in the same class. The analysis is automated and identifies prostheses based on set criteria. These include:

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

The Poisson probability of observing that number of revisions, given the rate of the group is significant ($p<0.05$),
and either:

There are at least 10 primary procedures for that component,
or

The proportion revised is at least 75% and there have been at least two revisions.

The Registry has the capacity to assess the outcome of individual prostheses or combinations 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.

If a prosthesis is identified in more than two combinations with 10 or more procedures in Stage 1, an additional analysis of the individual prosthesis is undertaken for review at Stage 2, regardless of whether the individual prosthesis was identified in Stage 1. The purpose of this is to simplify the reporting of an individual prosthesis and to avoid identifying the same prosthesis in multiple combinations when it may be more appropriate to identify it individually.

A prosthesis or combination may also be brought to the attention of the Registry by the Therapeutic Goods Administration (TGA) or a member of the AOA. A further investigation may then be undertaken as outlined in Stage 2.

It has been apparent that the revision rates for total stemmed anatomic shoulder replacements have been confounded by the higher than anticipated rate of revision of modular metal backed glenoid prostheses in this class. The Clinical Directors have decided to re-analyse Stage 1 for total stemmed anatomic combinations in comparison to the total stemmed anatomic class excluding modular metal backed glenoids. The new comparator only applied to Newly Identified prostheses. Re-identified and Still Used and

Identified and no longer used are compared to all other procedures in this class. The new comparator will apply to all sections in subsequent reports.

Stage 2

In Stage 2, the AOANJRR Clinical Director, Deputy Clinical Directors, and Assistant Deputy Clinical Directors in conjunction with SAHMRI staff, review the identified prostheses and undertake further investigation. This includes examining 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 modern prostheses in the same class, then the prosthesis or prosthesis combination progresses to Stage 3. The possible exception to this is the presence of confounding factors, such as use in complex primary procedures.

Stage 3

The final stage involves review by a panel of independent orthopaedic surgeons from the AOA and the Arthroplasty Society of Australia or the Shoulder and Elbow Society. The panel meets with Registry staff at joint specific workshops to review the Stage 2 analysis and determine which prostheses will be identified in the Annual Report.

Identified Prostheses

Identified prostheses are listed in one of three groups. The first group 'Newly Identified', lists prostheses that are identified for the first time and are still used.

The second group is 'Re-Identified and Still Used'. This listing identifies prostheses that continue to have a higher than anticipated rate of revision and provides information on their 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 identification in the Annual Report.

Prostheses that have a higher rate of revision but are no longer used in Australia make up the third group: 'Identified and No Longer Used'. These are listed to provide ongoing information on the rate of revision. This also enables comparison of other prostheses to the discontinued group. This group may include prostheses that are no longer used in Australia that 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. The Registry monitors the continual real-time performance of prostheses within a community and the Annual Report provides the outcome 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 Annual 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.

Prior to publication, three workshops were held to review, comment, and provide advice on all sections of the report. Members of the AOA, Arthroplasty Society of Australia, and Shoulder and Elbow Society are invited to attend these surgeon workshops.

The hip, knee and shoulder surgeon workshops were held in Adelaide on the weekend of the 2 and 3 August 2025. In addition to AOANJRR and SAHMRI staff, 17 hip, 16 knee and 4 shoulder arthroplasty specialists from the AOA membership attended the workshops.

Investigations of prostheses identified as having a higher than anticipated rate of revision are available on the Registry website:

Primary Partial Shoulder Replacement

HEMI STEMMED ANATOMIC

There are no newly identified hemi stemmed anatomic shoulder prostheses.

Table SSR279 Revision Rate of Hemi Stemmed Anatomic Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

Humeral Stem/Head	N Revised	N Total	Obs. Years	Revisions/ 100 Obs. Yrs	Hazard Ratio, P Value
Re-Identified and Still Used					
Delta Xtend/Delta Xtend	14	79	524	2.67	Entire Period: HR=1.83 (95% CI 1.07, 3.13), p=0.026
Global Unite/Global Unite	43	227	1374	3.13	Entire Period: HR=1.77 (95% CI 1.29, 2.43), p<0.001

Note: Components have been compared to all other modern hemi stemmed anatomic shoulder components

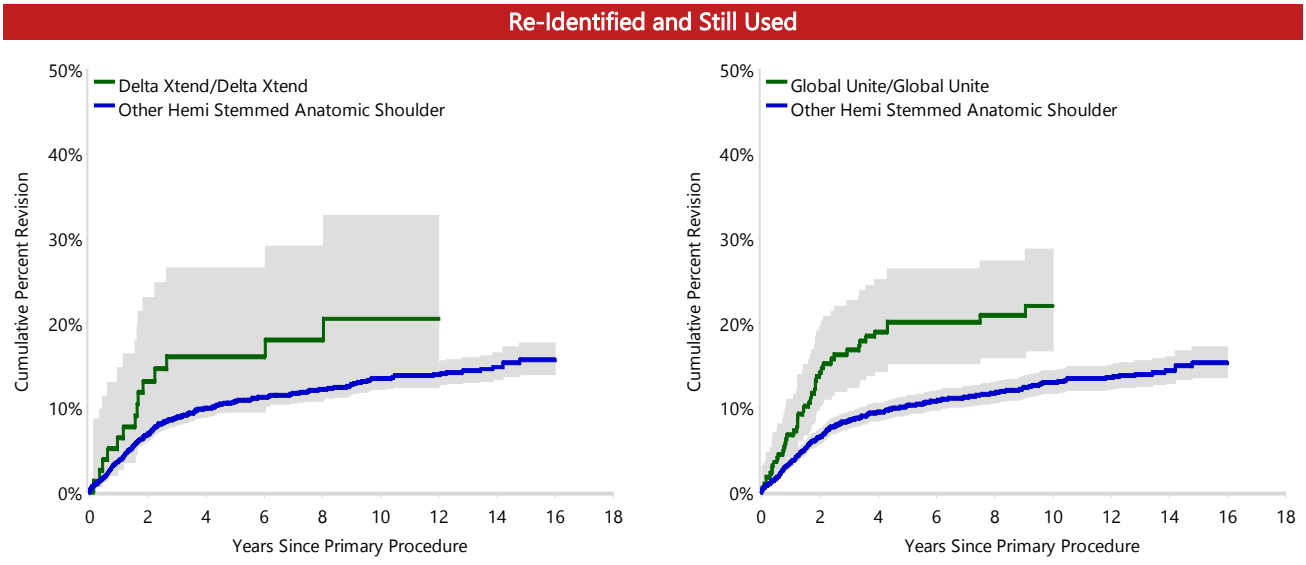
Table SSR280 Cumulative Percent Revision of Hemi Stemmed Anatomic Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

CPR	1 Yr	3 Yrs	5 Yrs	7 Yrs	13 Yrs
Re-Identified and Still Used					
Delta Xtend/Delta Xtend	6.4 (2.7, 14.7)	16.0 (9.4, 26.5)	16.0 (9.4, 26.5)	17.9 (10.8, 29.0)	
Global Unite/Global Unite	6.8 (4.1, 11.0)	16.8 (12.3, 22.6)	20.1 (15.2, 26.3)	20.1 (15.2, 26.3)	

Table SSR281 Yearly Usage of Hemi Stemmed Anatomic Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

Year of Implant	≤2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Re-Identified and Still Used	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Delta Xtend/Delta Xtend	7	9	9	5	10	7	6	5	4	3	6	3	1	.	1	2	1
Global Unite/Global Unite	.	.	.	.	15	37	25	38	37	14	12	11	12	6	2	7	11

Figure SSR199 Cumulative Percent Revision of Re-Identified and Still Used Hemi Stemmed Anatomic Shoulder Prostheses



TOTAL STEMMED ANATOMIC

There are no newly identified total stemmed anatomic shoulder prostheses.

Table SSR282 Revision Rate of Total Stemmed Anatomic Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

Humeral Stem/Glenoid	N Revised	N Total	Obs. Years	Revisions/ 100 Obs. Yrs	Hazard Ratio, P Value
Re-Identified and Still Used	.	.	.	.	
Equinoxe/Equinoxe (All Poly)	35	305	1739	2.01	0 - 1.5Yr: HR=1.40 (95% CI 0.73, 2.66), p=0.309
	.	.	.	.	1.5Yr+: HR=3.55 (95% CI 2.31, 5.46), p<0.001
Equinoxe/Equinoxe (Hybrid Glenoid)	49	453	2093	2.34	0 - 2.5Yr: HR=1.59 (95% CI 1.03, 2.46), p=0.036
	.	.	.	.	2.5Yr+: HR=4.81 (95% CI 3.05, 7.59), p<0.001
Identified and no longer used	.	.	.	.	
Comprehensive/Custom Made (Comprehensive)	7	18	75	9.35	Entire Period: HR=8.52 (95% CI 4.00, 18.16), p<0.001
SMR/SMR L1	481	2440	19517	2.46	Entire Period: HR=2.94 (95% CI 2.54, 3.41), p<0.001
SMR/SMR L2	328	856	7108	4.61	Entire Period: HR=6.55 (95% CI 5.57, 7.70), p<0.001
Univers 3D/Univers 3D	17	34	305	5.57	Entire Period: HR=7.46 (95% CI 4.53, 12.27), p<0.001
Vaios/Vaios	19	36	227	8.36	Entire Period: HR=9.61 (95% CI 6.02, 15.33), p<0.001

Note: Components have been compared to all other modern total stemmed anatomic shoulder components

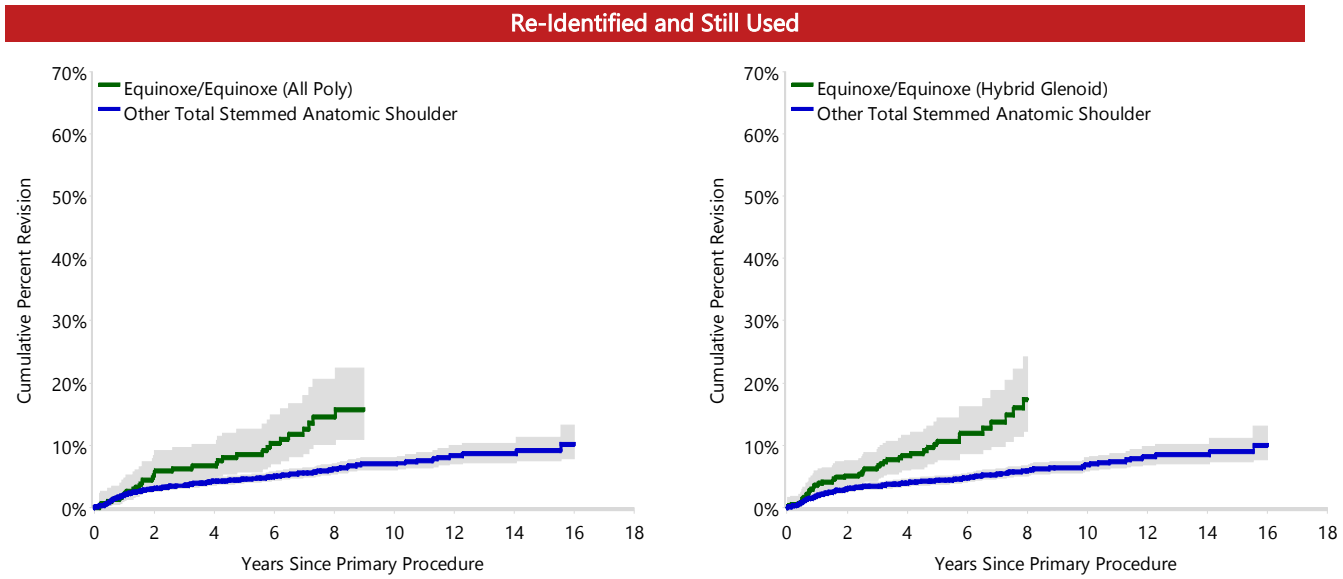
Table SSR283 Cumulative Percent Revision of Total Stemmed Anatomic Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

CPR	1 Yr	3 Yrs	5 Yrs	7 Yrs	13 Yrs
Re-Identified and Still Used					
Equinoxe/Equinoxe (All Poly)	2.0 (0.9, 4.4)	6.2 (3.9, 9.7)	8.5 (5.7, 12.6)	12.6 (8.7, 18.0)	
Equinoxe/Equinoxe (Hybrid Glenoid)	3.6 (2.2, 5.8)	6.4 (4.4, 9.2)	10.5 (7.7, 14.4)	13.7 (9.9, 18.8)	
Identified and no longer used					
Comprehensive/Custom Made (Comprehensive)	16.7 (5.7, 43.2)	27.8 (12.6, 54.4)	33.8 (16.8, 60.4)		
SMR/SMR L1	5.9 (5.1, 6.9)	11.4 (10.2, 12.7)	13.7 (12.4, 15.2)	16.2 (14.7, 17.7)	26.2 (23.8, 28.9)
SMR/SMR L2	9.5 (7.7, 11.7)	22.2 (19.6, 25.2)	29.8 (26.9, 33.1)	34.1 (31.0, 37.4)	40.1 (36.8, 43.7)
Univers 3D/Univers 3D	5.9 (1.5, 21.5)	14.7 (6.4, 31.8)	21.2 (10.7, 39.4)	31.0 (18.0, 50.1)	48.9 (32.7, 68.0)
Vaios/Vaios	13.9 (6.0, 30.2)	27.8 (16.0, 45.5)	39.1 (25.3, 57.0)	48.7 (33.6, 66.4)	57.0 (40.5, 74.6)

Table SSR284 Yearly Usage of Total Stemmed Anatomic Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

Year of Implant	≤2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Re-Identified and Still Used	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equinoxe/Equinoxe (All Poly)	.	.	.	6	10	26	18	8	23	36	45	37	18	28	24	24	2
Equinoxe/Equinoxe (Hybrid Glenoid)	.	.	.	.	.	.	14	38	19	35	34	68	74	64	62	24	21
Identified and no longer used	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Comprehensive/Custom Made (Comprehensive)	.	.	.	.	.	.	.	.	1	4	7	5	1	.	.	.	.
SMR/SMR L1	372	247	.	.	156	302	256	242	195	172	128	98	72	70	65	65	.
SMR/SMR L2	.	43	343	336	134	.	.	.	.	.	.	.	.	.	.	.	.
Univers 3D/Univers 3D	34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vaios/Vaios	.	.	.	16	17	2	1	.	.	.	.	.	.	.	.	.	.

Figure SSR2001 Cumulative Percent Revision of Re-Identified and Still Used Total Stemmed Anatomic Shoulder Prostheses



TOTAL STEMMED REVERSE

There is one newly identified total stemmed reverse shoulder prostheses.

The Equinoxe/Equinoxe total stemmed reverse combination was first used in 2011 and is categorised as total stemmed reverse with a polyethylene humeral insert and a modular metal glenosphere and glenoid base plate. There have been 7,299 procedures, of which 45.4% were for osteoarthritis, 34.3% rotator cuff arthropathy and 14.4% for fracture. The cumulative percent revision at 9 years is 7.3%. Of the 271 revisions, 90 have been for infection, 78 for instability/dislocation and 39 for loosening. The majority (181/271) have been major revisions. The bearing surface of this implant combination is (humeral/glenoid) non-XLPE/metal.

The previously identified Trabecular Metal/Comprehensive combination no longer fulfils the criteria for identification in 2024.

Table SSR285 Revision Rate of Total Stemmed Reverse Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

Humeral Stem/Glenoid	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs	Hazard Ratio, P Value
Newly Identified	.	.	.	.	
Equinoxe/Equinoxe	271	7299	22812	1.19	0 - 2Wk: HR=1.17 (95% CI 0.79, 1.73), p=0.439
	.	.	.	.	2Wk - 3Mth: HR=0.75 (95% CI 0.57, 0.99), p=0.038
	.	.	.	.	3Mth - 1.5Yr: HR=1.12 (95% CI 0.90, 1.38), p=0.310
	.	.	.	.	1.5Yr - 2Yr: HR=1.49 (95% CI 0.96, 2.32), p=0.078
	.	.	.	.	2Yr - 3.5Yr: HR=0.92 (95% CI 0.60, 1.41), p=0.705
	.	.	.	.	3.5Yr+: HR=2.57 (95% CI 1.84, 3.59), p<0.001
Re-Identified and Still Used	.	.	.	.	
SMR/SMR L1	505	11877	61575	0.82	0 - 3Mth: HR=1.61 (95% CI 1.38, 1.88), p<0.001
	.	.	.	.	3Mth - 1.5Yr: HR=1.10 (95% CI 0.92, 1.31), p=0.281
	.	.	.	.	1.5Yr+: HR=0.64 (95% CI 0.52, 0.78), p<0.001
Verso/Verso	7	40	107	6.52	Entire Period: HR=4.76 (95% CI 2.27, 9.99), p<0.001

Note: Components have been compared to all other modern total stemmed reverse shoulder components.
This combination is one of two that have reached the 'non-inferior' 10 year performance benchmark (for further information refer to the 10, 15, 20 Year Prosthesis Outcomes chapter in this report).

Table SSR286 Cumulative Percent Revision of Total Stemmed Reverse Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

CPR	1 Yr	3 Yrs	5 Yrs	7 Yrs	13 Yrs
Newly Identified					
Equinoxe/Equinoxe	2.3 (2.0, 2.7)	3.6 (3.1, 4.1)	4.5 (3.9, 5.1)	6.2 (5.2, 7.2)	
Re-Identified and Still Used					
SMR/SMR L1	2.9 (2.6, 3.2)	3.9 (3.6, 4.3)	4.3 (3.9, 4.7)	4.7 (4.3, 5.1)	6.0 (5.2, 6.9)
Verso/Verso	15.3 (7.2, 31.0)	18.6 (9.3, 35.3)	18.6 (9.3, 35.3)		

Table SSR287 Yearly Usage of Total Stemmed Reverse Shoulder Prostheses Identified as Having a Higher than Anticipated Rate of Revision

Year of Implant	≤2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Newly Identified	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equinoxe/Equinoxe	.	.	.	1	9	14	32	103	168	332	495	675	855	955	1057	1346	1257
Re-Identified and Still Used	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SMR/SMR L1	407	271	.	.	248	563	633	732	914	930	1046	1055	1009	1191	1034	943	901
Verso/Verso	.	.	.	.	.	.	.	.	.	.	5	8	1	6	5	13	2

Figure SSR2012 Cumulative Percent Revision of Newly Identified Total Stemmed Reverse Shoulder Prostheses

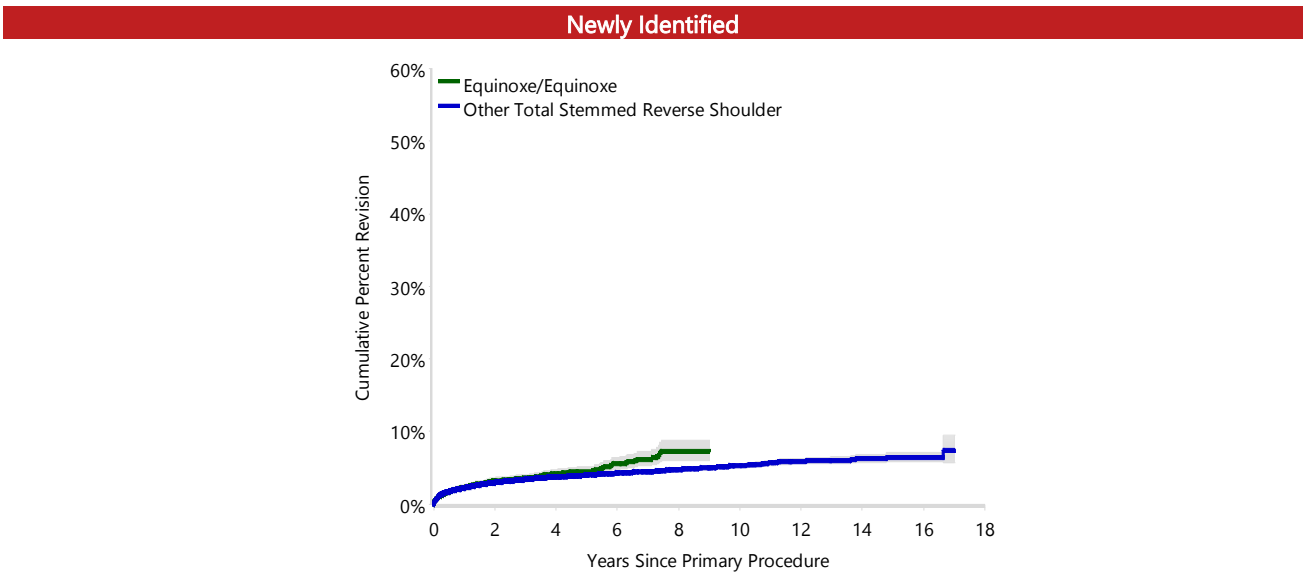
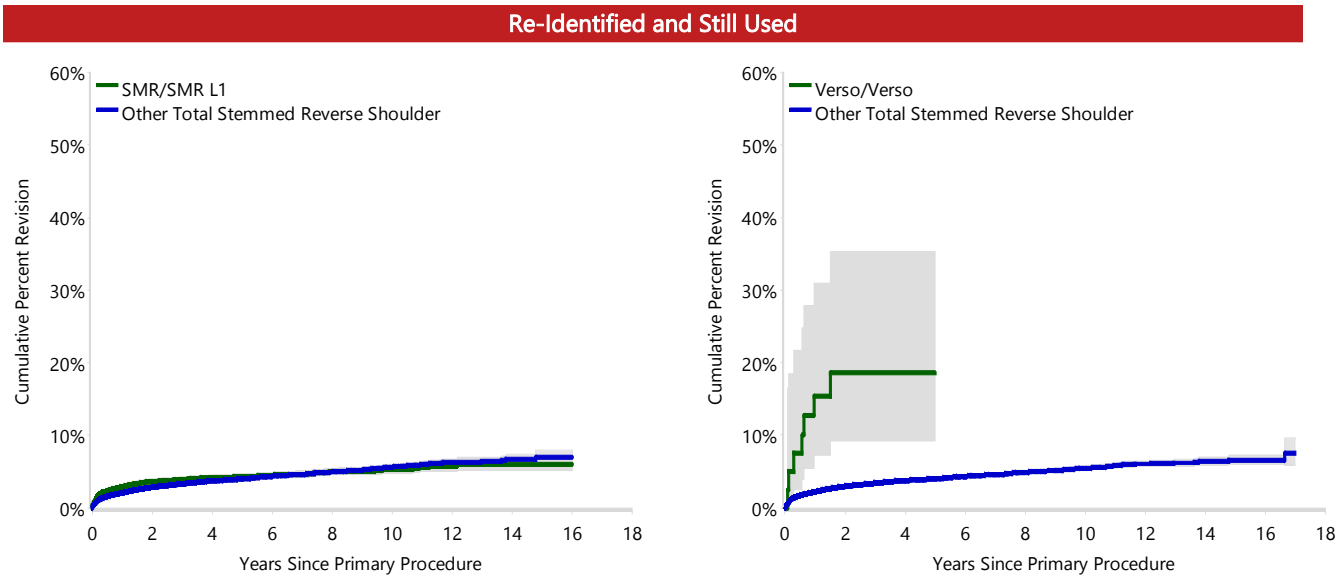


Figure SSR2023 Cumulative Percent Revision of Re-Identified and Still Used Total Stemmed Reverse Shoulder Prostheses



No Longer Used Shoulder Replacement Classes

There is one class of shoulder replacement no longer used: total resurfacing anatomic. This class is defined in the section on shoulder replacement. Total resurfacing anatomic shoulder replacement was last used in 2020.

PRIMARY TOTAL RESURFACING ANATOMIC

Total resurfacing anatomic is a subcategory of primary total shoulder replacement. It involves glenoid replacement and the use of a humeral prosthesis that replaces the humeral articular surface without resecting the head.

There are 235 total resurfacing anatomic shoulder replacements. There have been no further procedures since 2020 (Table SSR288).

The majority of procedures were undertaken in males and the mean age for males is younger than for females (Table SSR290).

Table SSR288 Number of Revisions of Primary Total Resurfacing Anatomic Shoulder Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2005	1	1
2006	2	4
2007	2	8
2008	2	12
2009	1	11
2010	5	14
2011	6	34
2012	1	37
2013	3	36
2014	2	24
2015	1	19
2016	0	11
2017	1	10
2018	0	9
2019	1	4
2020	0	1
TOTAL	**28**	**235**

Osteoarthritis was the most common primary diagnosis (Table SSR289).

The most common reason for revision is loosening (Table SSR292). The most common type of revision is to a total shoulder replacement (Table SSR293).

Table SSR289 Primary Total Resurfacing Anatomic Shoulder Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	226	96.2
Rheumatoid Arthritis	3	1.3
Fracture	2	0.9
Other Inflammatory Arthritis	1	0.4
Instability	1	0.4
Rotator Cuff Arthropathy	1	0.4
Osteonecrosis	1	0.4
TOTAL	**235**	**100.0**

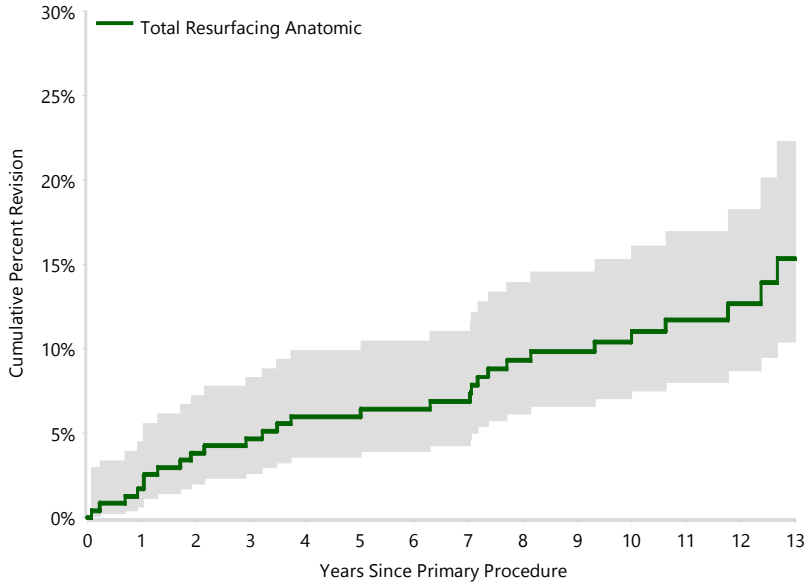
Table SSR290 Age and Gender of Primary Total Resurfacing Anatomic Shoulder Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	140	59.6%	35	83	63	62.2	9.8
Female	95	40.4%	46	86	67	67.0	6.7
TOTAL	**235**	**100.0%**	**35**	**86**	**65**	**64.1**	**9.0**

Table SSR291 Cumulative Percent Revision of Primary Total Resurfacing Anatomic Shoulder Replacement

Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Total Resurfacing Anatomic	28	235	1.7 (0.6, 4.5)	4.7 (2.6, 8.3)	6.0 (3.6, 9.9)	6.9 (4.3, 11.0)	11.0 (7.5, 16.1)
TOTAL	**28**	**235**					

Figure SSR203 Cumulative Percent Revision of Primary Total Resurfacing Anatomic Shoulder Replacement



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Total Resurfacing Anatomic	235	231	221	210	195	142

Table SSR292 Primary Total Resurfacing Anatomic Shoulder Replacement by Reason for Revision

Reason for Revision	Total Resurfacing Anatomic	
	N	Col%
Loosening	13	46.4
Instability/Dislocation	3	10.7
Implant Breakage Glenoid Insert	3	10.7
Rotator Cuff Insufficiency	3	10.7
Infection	2	7.1
Wear Glenoid Insert	1	3.6
Fracture	1	3.6
Lysis	1	3.6
Implant Breakage Glenoid	1	3.6
TOTAL	**28**	**100.0**

Table SSR293 Primary Total Resurfacing Anatomic Shoulder Replacement by Type of Revision

Type of Revision	Total Resurfacing Anatomic	
	N	Col%
Humeral/Glenoid	16	57.1
Humeral Component	7	25.0
Insert Only	2	7.1
Cement Spacer	1	3.6
Head Only	1	3.6
Reoperation	1	3.6
TOTAL	**28**	**100.0**

Note: Humeral heads are replaced when the humeral component is revised.

Mortality and Survival after Primary Shoulder Replacement

Summary

Mortality information has been obtained by matching all procedures reported to the Registry up to and including 31 December 2024 with the National Death Index (NDI). The NDI is the national mortality database maintained by the Australian Institute of Health and Welfare (AIHW). The Registry was granted access to this data following a formal ethics application to AIHW.

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

The rate per 100 person years has been calculated from the date of the first joint procedure to either the date of death or 31 December 2024. This provides a true rate.

Primary Shoulder Replacement

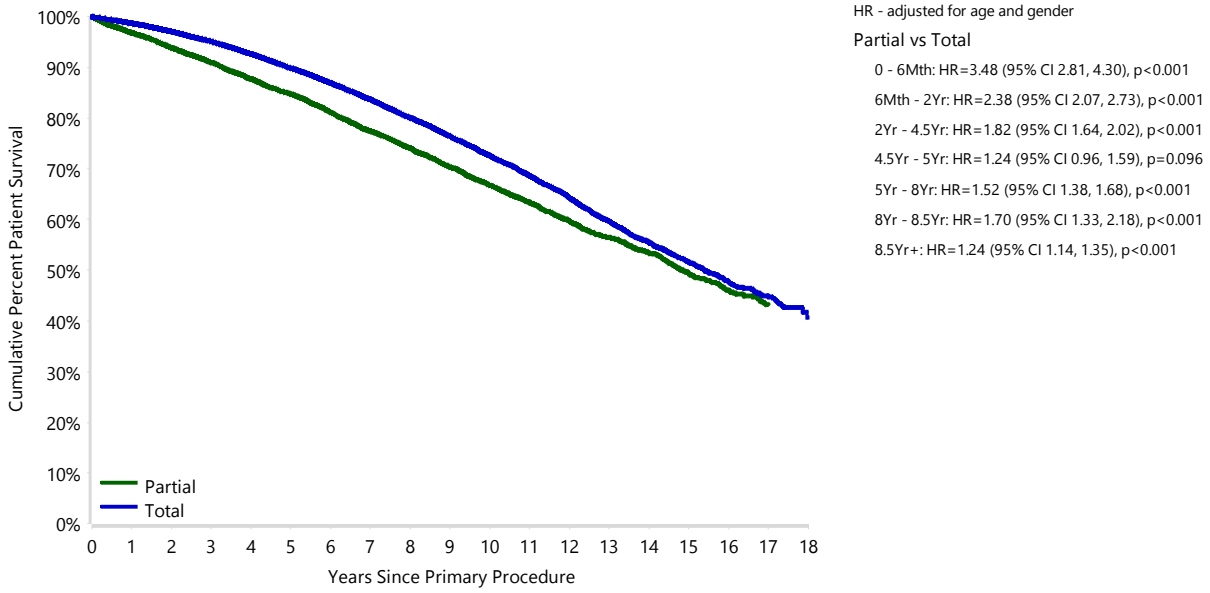
Table SSR294 Mortality following Primary Shoulder Replacement by Category

Shoulder Category	N Death	N Patients	% Deaths	Standardised Mortality	Person Years	Rate per 100 Person Yrs (95% CI)
Partial	2289	6252	36.6	16.8	54095	4.23 (4.06, 4.41)
Total	7860	47551	16.5	10.5	265823	2.96 (2.89, 3.02)
TOTAL	**10149**	**53803**	**18.9**	**11.9**	**319918**	**3.17 (3.11, 3.23)**

Table SSR295 Yearly Cumulative Percent Survival of Patients with Primary Shoulder Replacement by Category

CPS	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Partial	96.8 (96.3, 97.2)	91.0 (90.2, 91.7)	84.6 (83.7, 85.5)	77.4 (76.3, 78.5)	66.7 (65.4, 68.0)	53.4 (51.8, 54.9)
Total	98.6 (98.5, 98.8)	95.1 (94.9, 95.3)	89.8 (89.5, 90.1)	83.7 (83.2, 84.1)	72.6 (72.0, 73.2)	55.5 (54.4, 56.5)

Figure SSR204 Cumulative Percent Survival of Patients with Primary Shoulder Replacement by Category



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Partial	6252	5857	5167	4443	3727	2672	1142
Total	47551	41739	31572	22822	15647	7862	2197

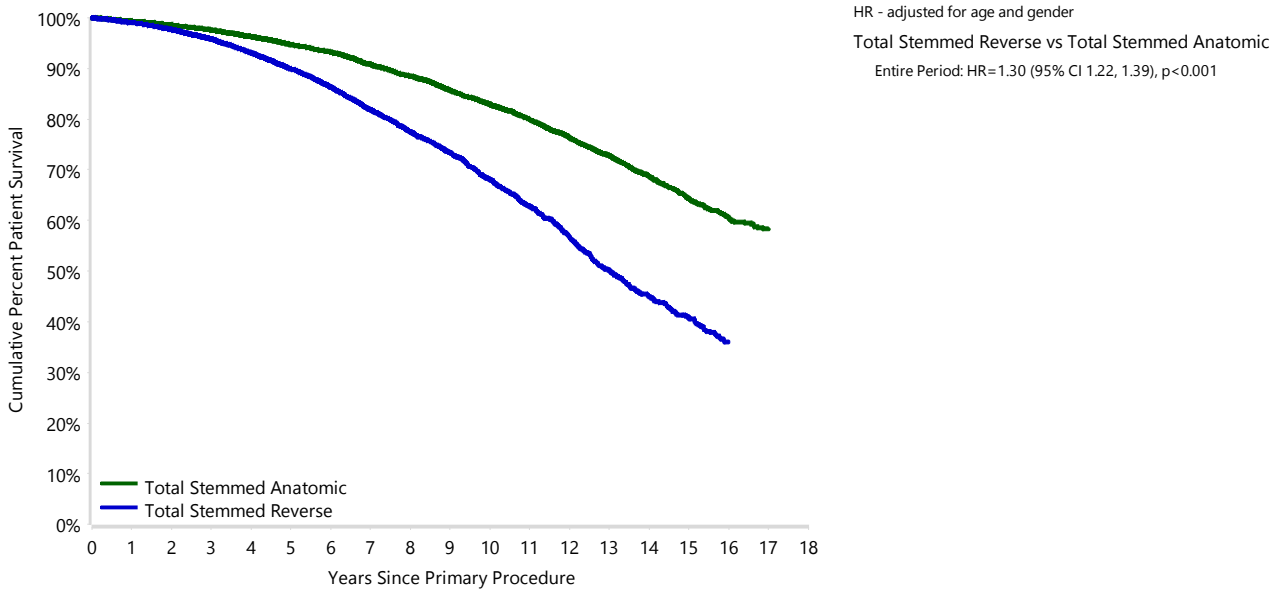
Table SSR296 Mortality following Primary Total Shoulder Replacement (Primary Diagnosis OA)

Total Shoulder Class	N Death	N Patients	% Deaths	Standardised Mortality	Person Years	Rate per 100 Person Yrs (95% CI)
Total Stemmed Anatomic	1711	8487	20.2	6.4	78600	2.18 (2.07, 2.28)
Total Stemmed Reverse	2168	13218	16.4	3.8	67203	3.23 (3.09, 3.36)
TOTAL	**3879**	**21705**	**17.9**	**4.8**	**145803**	**2.66 (2.58, 2.75)**

Table SSR297 Yearly Cumulative Percent Survival of Patients with Primary Total Shoulder Replacement (Primary Diagnosis OA)

CPS	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemmed Anatomic	99.4 (99.2, 99.5)	97.6 (97.2, 97.9)	94.7 (94.2, 95.2)	90.8 (90.1, 91.5)	83.0 (82.0, 83.9)	68.7 (67.2, 70.1)
Total Stemmed Reverse	99.0 (98.9, 99.2)	95.8 (95.4, 96.2)	89.9 (89.2, 90.5)	81.9 (80.9, 82.8)	68.1 (66.6, 69.5)	44.9 (42.5, 47.2)

Figure SSR205 Cumulative Percent Survival of Patients with Primary Total Shoulder Replacement (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	14 Yrs
Total Stemmed Anatomic	8487	8269	7637	6825	5831	3856	1384
Total Stemmed Reverse	13218	11418	8479	5866	3696	1597	352

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