SMR/SMR L1 Total Stemmed Reverse Shoulder Investigation

Note: This analysis compares the SMR/SMR L1 humeral stem/glenoid combination with all other total stemmed reverse shoulder prostheses.

This combination has been identified as having a significantly higher rate of revision. For a detailed explanation of the process used by the Registry that results in identification of prostheses that have a higher than anticipated rate of revision please refer to the Prostheses with Higher than Anticipated Rates of Revision chapter of the most recent AOANJRR Annual Report, https://aoanjrr.sahmri.com/annual-reports-2025.

Note: Procedures using prostheses with no recorded use in 2024 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Stemmed Reverse Shoulder Replacement

The revision rate of the SMR/SMR L1 total stemmed reverse shoulder combination is compared to all other total stemmed reverse shoulder prostheses.

Table 1: Revision Rates of Primary Total Stemmed Reverse Shoulder Replacement

Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
SMR/SMR L1	505	11877	61575	0.82 (0.75, 0.89)
Other Total Stemmed Reverse Shoulder	1859	52767	217327	0.86 (0.82, 0.90)
TOTAL	**2364**	**64644**	**278903**	**0.85 (0.81, 0.88)**

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement

The yearly cumulative percent revision of the SMR/SMR L1 total stemmed reverse shoulder combination is compared to all other total stemmed reverse shoulder prostheses.

Table 2: Yearly Cumulative Percent Revision (95% CI) of Primary Total Stemmed Reverse Shoulder Replacement

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
SMR/SMR L1	2.9 (2.6, 3.2)	3.6 (3.3, 4.0)	3.9 (3.6, 4.3)	4.1 (3.8, 4.5)	4.3 (3.9, 4.7)	4.5 (4.1, 4.9)
Other Total Stemmed Reverse Shoulder	2.1 (2.0, 2.2)	2.9 (2.7, 3.0)	3.3 (3.2, 3.5)	3.7 (3.6, 3.9)	4.0 (3.8, 4.2)	4.4 (4.2, 4.6)

CPR	7 Yrs	8 Yrs	9 Yrs	10 Yrs	11 Yrs	12 Yrs
SMR/SMR L1	4.7 (4.3, 5.1)	5.0 (4.5, 5.5)	5.1 (4.6, 5.6)	5.3 (4.8, 5.8)	5.6 (5.0, 6.3)	5.7 (5.1, 6.5)
Other Total Stemmed Reverse Shoulder	4.6 (4.4, 4.9)	5.0 (4.7, 5.2)	5.2 (4.9, 5.5)	5.6 (5.3, 6.0)	6.0 (5.6, 6.4)	6.3 (5.8, 6.7)

CPR	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs
SMR/SMR L1	6.0 (5.2, 6.9)	6.0 (5.2, 6.9)	6.0 (5.2, 6.9)	6.0 (5.2, 6.9)	
Other Total Stemmed Reverse Shoulder	6.4 (5.9, 6.9)	6.7 (6.0, 7.4)	7.0 (6.1, 7.9)	7.0 (6.1, 7.9)	

Note: Prostheses no longer used in 2024 are excluded from the comparator.

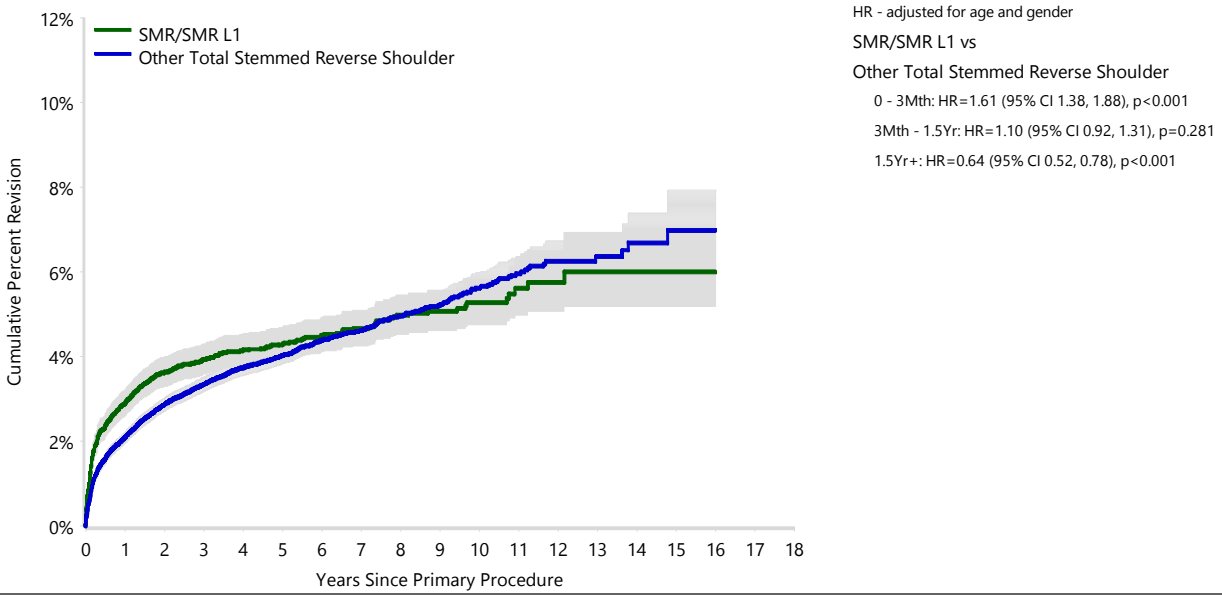
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement

The yearly cumulative percent revision of the SMR/SMR L1 total stemmed reverse shoulder combination is compared to all other total stemmed reverse shoulder prostheses. In addition, hazard ratios are reported.

Hazard ratios are reported for specific time periods during which the hazard ratio is constant. This is done to enable more specific and valid comparisons of the risk of revision over time. The pattern of variation in risk has important implications with respect to the underlying reasons for any difference.

Figure 1: Cumulative Percent Revision of Primary Total Stemmed Reverse Shoulder Replacement



Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs
SMR/SMR L1	11877	10490	9342	8122	6776	5665	4507	3411	2531
Other Total Stemmed Reverse Shoulder	52767	43177	35091	28840	23008	18011	13561	9898	6926

Number at Risk	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs
SMR/SMR L1	1780	1207	767	419	268	236	212	103	34
Other Total Stemmed Reverse Shoulder	4908	3436	2280	1462	864	490	287	114	33

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 3

Primary Diagnosis for Revised Primary Total Stemmed Reverse Shoulder Replacement

This table identifies the diagnosis of the primary procedure which was subsequently revised. This information is provided as there is a variation on outcome depending on the primary diagnosis. It is therefore important when considering the reasons for a higher than anticipated rate of revision that there is identification of the primary diagnosis. This information should be compared to the primary diagnosis for the revisions of all other total stemmed reverse shoulder prostheses.

Table 3: Primary Diagnosis for Revised Primary Total Stemmed Reverse Shoulder Replacement

	SMR/SMR L1		Other Total Stemmed Reverse Shoulder	
Primary Diagnosis	Number	Percent	Number	Percent
Rotator Cuff Arthropathy	173	34.3	712	38.3
Osteoarthritis	189	37.4	710	38.2
Fracture	111	22.0	295	15.9
Rheumatoid Arthritis	8	1.6	46	2.5
Instability	10	2.0	34	1.8
Tumour	2	0.4	33	1.8
Osteonecrosis	9	1.8	20	1.1
Other Inflammatory Arthritis	3	0.6	8	0.4
Other			1	0.1
TOTAL	**505**	**100.0**	**1859**	**100.0**

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 4

Reasons for Revision

This is reported in two ways: a percentage of primary procedures revised and as a percentage of all revision procedures.

% Primaries Revised: This shows the proportional contribution of each revision diagnosis as a percentage of the total number of primary procedures. This percentage can be used to approximate the risk of being revised for that diagnosis. Differing percentages between groups, with the same distribution of follow up time, may identify problems of concern.

% Revisions: The number of revisions for each diagnosis is expressed as a percentage of the total number of revisions. This shows the distribution of reasons for revision within a group but cannot be used as a comparison between groups.

Table 4: Primary Total Stemmed Reverse Shoulder Replacement - Reason for Revision

	SMR/SMR L1			Other Total Stemmed Reverse Shoulder		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Instability/Dislocation	179	1.5	35.4	569	1.1	30.6
Infection	86	0.7	17.0	522	1.0	28.1
Loosening	104	0.9	20.6	274	0.5	14.7
Fracture	64	0.5	12.7	193	0.4	10.4
Dissociation	10	0.1	2.0	74	0.1	4.0
Pain	12	0.1	2.4	37	0.1	2.0
Lysis	4	0.0	0.8	23	0.0	1.2
Malposition	5	0.0	1.0	20	0.0	1.1
Arthrofibrosis	18	0.2	3.6	8	0.0	0.4
Implant Breakage Glenoid	1	0.0	0.2	17	0.0	0.9
Incorrect Sizing	3	0.0	0.6	14	0.0	0.8
Heterotopic Bone	1	0.0	0.2	13	0.0	0.7
Metal Related Pathology	5	0.0	1.0	8	0.0	0.4
Rotator Cuff Insufficiency	2	0.0	0.4	7	0.0	0.4
Wear Humeral Cup	1	0.0	0.2	7	0.0	0.4
Implant Breakage Humeral				6	0.0	0.3
Tumour	1	0.0	0.2	4	0.0	0.2
Implant Breakage Glenoid Insert				3	0.0	0.2
Glenoid Erosion				2	0.0	0.1
Wear Glenoid Insert	1	0.0	0.2			
Other	8	0.1	1.6	58	0.1	3.1
N Revision	**505**	**4.3**	**100.0**	**1859**	**3.5**	**100.0**
N Primary	**11877**			**52767**		

Note: Prostheses no longer used in 2024 are excluded from the comparator.

FIGURE 2

Cumulative Incidence Revision Diagnosis of Primary Total Stemmed Reverse Shoulder Replacement

This figure details the cumulative incidence of the most common reasons for revision. The five most common reasons for revision are included as long as each of these reasons account for more than 10 procedures or at least 5% of all revisions for the SMR/SMR L1 total stemmed reverse shoulder combination. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total stemmed reverse shoulder prostheses.

Figure 2: Cumulative Incidence Revision Diagnosis for Primary Total Stemmed Reverse Shoulder Replacement

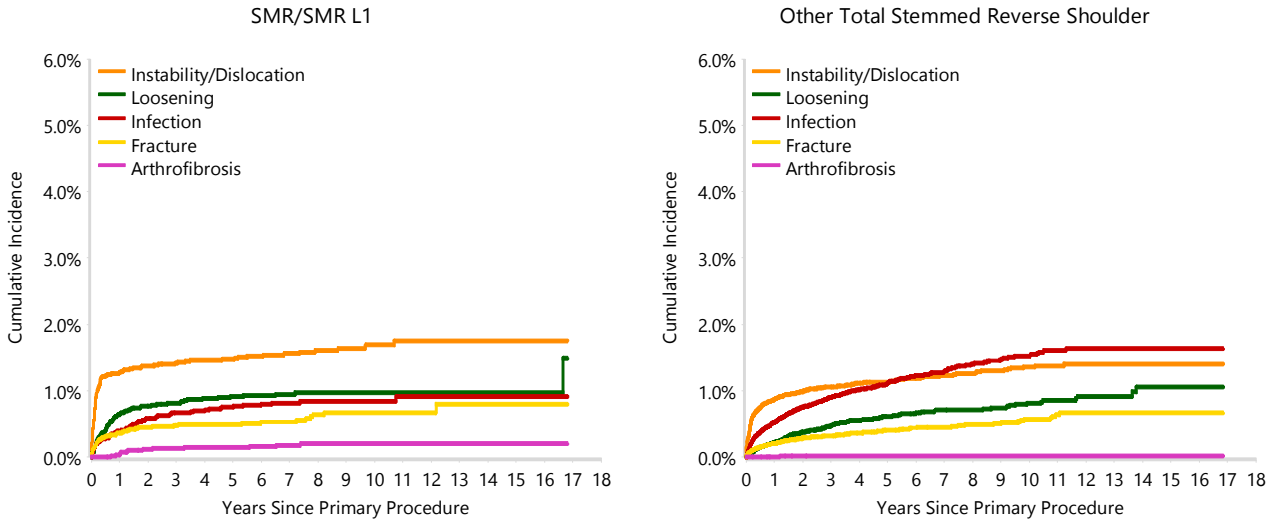


TABLE 5

Type of Revision Performed for Primary Total Stemmed Reverse Shoulder Replacement

This analysis identifies the components used in the revision of the SMR/SMR L1 total stemmed reverse shoulder combination and compares it to the components used in the revision of all other total stemmed reverse shoulder prostheses.

The reason this analysis is undertaken is to identify whether there is one or more components which are being replaced that differ from the components replaced for revisions of all other total stemmed reverse shoulder prostheses i.e. is there a difference in the type of revision undertaken for the SMR/SMR L1 total stemmed reverse shoulder combination compared to all other total stemmed reverse shoulder prostheses.

Table 5: Primary Total Stemmed Reverse Shoulder Replacement - Type of Revision

	SMR/SMR L1		Other Total Stemmed Reverse Shoulder	
Type of Revision	Number	Percent	Number	Percent
Humeral Component	111	22.0	515	27.7
Cement Spacer	17	3.4	200	10.8
Humeral/Glenoid	36	7.1	198	10.7
Glenoid Component	40	7.9	133	7.2
Removal of Prostheses	14	2.8	25	1.3
Reinsertion of Components			4	0.2
N Major	**218**	**43.2**	**1075**	**57.8**
Cup/Head	99	19.6	348	18.7
Cup Only	88	17.4	282	15.2
Head Only	88	17.4	128	6.9
Minor Components	4	0.8	12	0.6
Cement Only	2	0.4	8	0.4
Reoperation	4	0.8	6	0.3
Head/Insert	2	0.4		
N Minor	**287**	**56.8**	**784**	**42.2**
TOTAL	**505**	**100.0**	**1859**	**100.0**

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 6

Revision Rates of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Fixation

This analysis is provided as some prostheses have more than one fixation option. Additionally there are prostheses where an alternative to the recommended approach to fixation was used e.g. a cementless prosthesis that has been cemented or vice-versa.

Table 6: Revised Number of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Fixation

Fixation	N Revised	N Total
Cemented	0	12
Cementless	467	11302
Hybrid (Glenoid Cemented)	16	141
Hybrid (Glenoid Cementless)	22	422
TOTAL	**505**	**11877**

TABLE 7

Revision Rates of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Bearing Surface

This analysis is provided as some prostheses are combined with a variety of bearing surfaces. All bearing surfaces used with this combination are listed.

Table 7: Revised Number of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/XLPE	0	8
Metal/XLPE	343	9231
XLPE/Metal	162	2622
Unknown	0	16
TOTAL	**505**	**11877**

TABLE 8

Number of Revisions of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the SMR/SMR L1 total stemmed reverse shoulder combination. It also provides the subsequent number of revisions of the primaries reported in that year.

Primary procedures performed in later years have had less follow up time therefore the number revised is expected to be less than the number revised in earlier years. For example, a primary procedure performed in 2024 has a maximum of one year to be revised, whereas a primary procedure performed in 2022 has a maximum of three years to be revised.

Table 8: Number of Revisions of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2005	0	2
2006	1	19
2007	17	124
2008	29	262
2009	13	271
2012	22	248
2013	31	563
2014	28	633
2015	43	732
2016	45	914
2017	33	930
2018	37	1046
2019	35	1055
2020	43	1009
2021	47	1191
2022	42	1034
2023	22	943
2024	17	901
TOTAL	**505**	**11877**