

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-2026>.

Note: Procedures using prostheses with no recorded use in 2025 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	542	12721	70814	0.77 (0.70, 0.83)
Other Total Stemmed Reverse Shoulder	2198	62000	264398	0.83 (0.80, 0.87)
TOTAL	2740	74721	335212	0.82 (0.79, 0.85)

Note: Prostheses no longer used in 2025 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
SMR/SMR L1	2.8 (2.6, 3.2)	3.6 (3.2, 3.9)	3.9 (3.5, 4.2)	4.1 (3.7, 4.4)	4.2 (3.9, 4.6)
Other Total Stemmed Reverse Shoulder	2.1 (1.9, 2.2)	2.8 (2.7, 3.0)	3.3 (3.1, 3.5)	3.7 (3.5, 3.9)	4.0 (3.8, 4.2)

CPR	6 Yrs	7 Yrs	8 Yrs	9 Yrs	10 Yrs	11 Yrs
SMR/SMR L1	4.4 (4.1, 4.8)	4.6 (4.2, 5.0)	4.9 (4.5, 5.3)	4.9 (4.5, 5.4)	5.1 (4.7, 5.6)	5.4 (4.8, 5.9)
Other Total Stemmed Reverse Shoulder	4.4 (4.2, 4.6)	4.6 (4.4, 4.8)	4.9 (4.7, 5.2)	5.2 (5.0, 5.5)	5.6 (5.3, 5.9)	5.9 (5.6, 6.3)

CPR	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs
SMR/SMR L1	5.7 (5.1, 6.4)	5.9 (5.2, 6.6)	5.9 (5.2, 6.6)	5.9 (5.2, 6.6)	5.9 (5.2, 6.6)	6.6 (5.1, 8.5)
Other Total Stemmed Reverse Shoulder	6.2 (5.8, 6.6)	6.3 (5.9, 6.8)	6.6 (6.1, 7.2)	7.0 (6.3, 7.8)	7.2 (6.4, 8.1)	7.7 (6.5, 9.2)

Note: Prostheses no longer used in 2025 are excluded from the comparator.

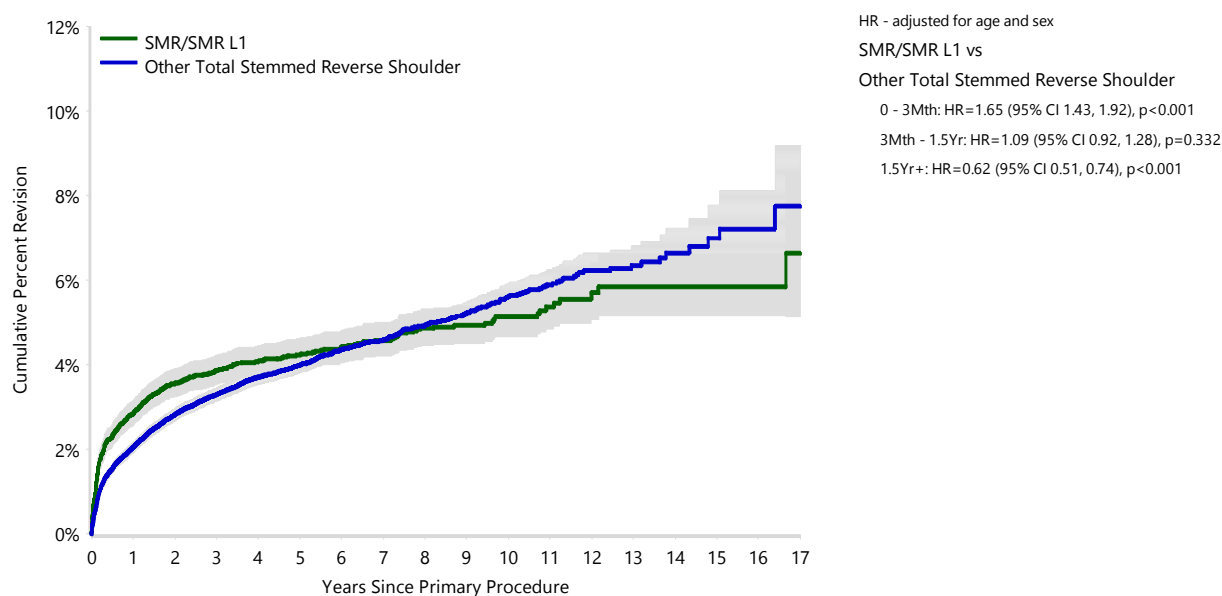
FIGURE 1

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	9 Yrs
SMR/SMR L1	12721	11381	10236	9057	7834	6511	5387	4227	3197	2363
Other Total Stemmed Reverse Shoulder	62000	51160	41969	34007	27792	22023	17105	12807	9246	6432

Number at Risk	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs
SMR/SMR L1	1627	1091	673	361	236	211	182	91	27	4
Other Total Stemmed Reverse Shoulder	4511	3094	2044	1277	748	428	243	97	29	6

Note: Prostheses no longer used in 2025 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

Primary Diagnosis	SMR/SMR L1		Other Total Stemmed Reverse Shoulder	
	Number	Percent	Number	Percent
Rotator Cuff Arthropathy	186	34.3	860	39.1
Osteoarthritis	201	37.1	832	37.9
Fracture	123	22.7	342	15.6
Rheumatoid Arthritis	8	1.5	53	2.4
Instability	10	1.8	39	1.8
Tumour	2	0.4	37	1.7
Osteonecrosis	9	1.7	24	1.1
Other Inflammatory Arthritis	3	0.6	9	0.4
Other			2	0.1
TOTAL	542	100.0	2198	100.0

Note: Prostheses no longer used in 2025 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

Revision Diagnosis	Number	SMR/SMR L1		Other Total Stemmed Reverse Shoulder		
		% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Instability/Dislocation	188	1.5	34.7	655	1.1	29.8
Infection	98	0.8	18.1	614	1.0	27.9
Loosening	111	0.9	20.5	328	0.5	14.9
Fracture	67	0.5	12.4	229	0.4	10.4
Dissociation	10	0.1	1.8	90	0.1	4.1
Pain	12	0.1	2.2	49	0.1	2.2
Lysis	4	0.0	0.7	30	0.0	1.4
Malposition	5	0.0	0.9	21	0.0	1.0
Arthrofibrosis	19	0.1	3.5	11	0.0	0.5
Implant Breakage Glenoid	1	0.0	0.2	18	0.0	0.8
Incorrect Sizing	6	0.0	1.1	17	0.0	0.8
Heterotopic Bone	1	0.0	0.2	13	0.0	0.6
Metal Related Pathology	5	0.0	0.9	11	0.0	0.5
Implant Breakage Humeral				10	0.0	0.5
Wear Humeral Cup	1	0.0	0.2	9	0.0	0.4
Rotator Cuff Insufficiency	2	0.0	0.4	7	0.0	0.3
Implant Breakage Glenoid Insert				6	0.0	0.3
Tumour	1	0.0	0.2	5	0.0	0.2
Glenoid Erosion				2	0.0	0.1
Wear Glenoid Insert	2	0.0	0.4	1	0.0	0.0
Prosthesis Dislocation				1	0.0	0.0
Other	9	0.1	1.7	71	0.1	3.2
N Revision	542	4.3	100.0	2198	3.5	100.0
N Primary	12721			62000		

Note: Prostheses no longer used in 2025 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

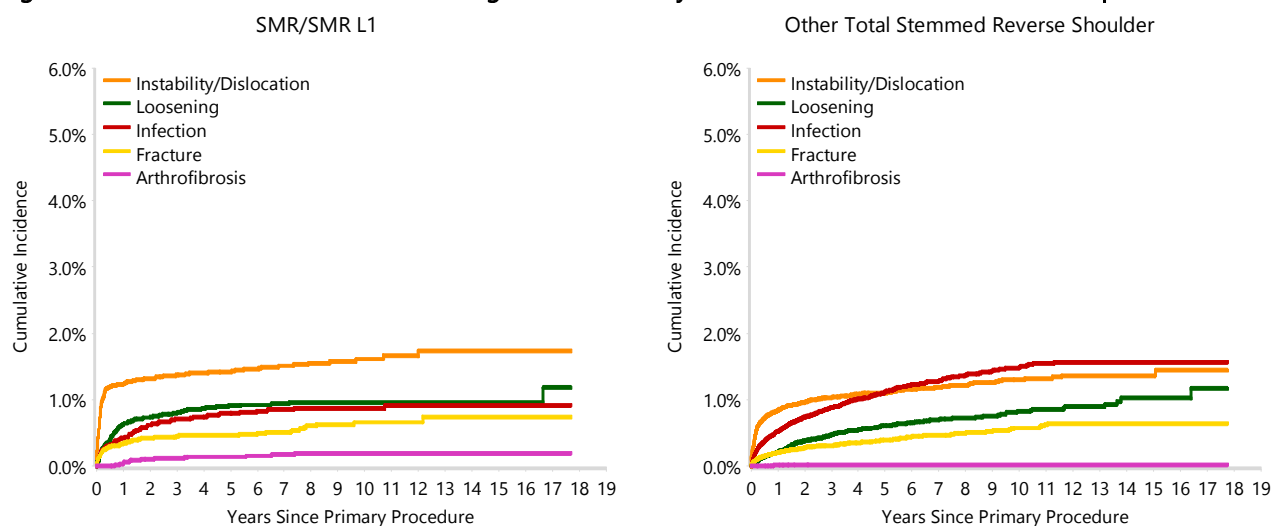


TABLE 5

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

Type of Revision	SMR/SMR L1		Other Total Stemmed Reverse Shoulder	
	Number	Percent	Number	Percent
Humeral Component	127	23.4	632	28.8
Humeral/Glenoid	36	6.6	261	11.9
Cement Spacer	22	4.1	229	10.4
Glenoid Component	42	7.7	149	6.8
Removal of Prostheses	14	2.6	31	1.4
Reinsertion of Components			4	0.2
N Major	241	44.5	1306	59.4
Cup/Head	109	20.1	401	18.2
Cup Only	90	16.6	314	14.3
Head Only	90	16.6	145	6.6
Minor Components	4	0.7	15	0.7
Cement Only	2	0.4	10	0.5
Reoperation	4	0.7	7	0.3
Head/Insert	2	0.4		
N Minor	301	55.5	892	40.6
TOTAL	542	100.0	2198	100.0

Note: Prostheses no longer used in 2025 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	500	12109
Hybrid (Glenoid Cemented)	16	144
Hybrid (Glenoid Cementless)	26	456
TOTAL	542	12721

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	9
Metal/XLPE	374	9920
XLPE/Metal	168	2771
Unknown	0	21
TOTAL	542	12721

TABLE 8

Revision Rates of Primary Total Stemmed Reverse Shoulder Replacement by State

This enables a state by state variation to be identified for the SMR/SMR L1 total stemmed reverse shoulder combination and provides the comparative data for each of the states for all other total stemmed reverse shoulder prostheses.

The purpose of this analysis is to determine if the higher than anticipated rate of revision has widespread distribution between states. If there is widespread distribution then the reason for the higher than anticipated rate of revision is unlikely to be surgeon specific. If the prosthesis has been used in only a small number of states it is not possible to distinguish if the higher than anticipated rate of revision is related to the prosthesis, surgeon, technique or patient.

Table 8: Revised Number of Primary Total Stemmed Reverse Shoulder Replacement by State

Component	State	N Revised	N Total
SMR/SMR L1	NSW	140	3807
	VIC	113	2145
	QLD	89	1758
	WA	121	2877
	SA	26	852
	TAS	18	516
	ACT/NT	35	766
Other Total Stemmed Reverse Shoulder	NSW	668	19667
	VIC	430	12245
	QLD	547	14913
	WA	269	7327
	SA	212	5322
	TAS	38	1299
	ACT/NT	34	1227
TOTAL		2740	74721

Note: Prostheses no longer used in 2025 are excluded from the comparator.

TABLE 9**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 2025 has a maximum of one year to be revised, whereas a primary procedure performed in 2023 has a maximum of three years to be revised.

Table 9: 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	23	248
2013	31	563
2014	29	633
2015	44	732
2016	45	914
2017	34	930
2018	37	1046
2019	37	1056
2020	43	1009
2021	50	1191
2022	46	1034
2023	25	946
2024	24	920
2025	14	821
TOTAL	542	12721

TABLE 10

Revision Rates of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Catalogue Number Range

Many prostheses have a number of catalogue ranges. The catalogue range is specific to particular design features; more than one catalogue range usually indicates a minor difference in design in a particular SMR/SMR L1 prosthesis.

This analysis has been undertaken to determine if the revision rate varies according to the catalogue number range.

Model	Catalogue Range	Catalogue Description	Cement	Material
Humeral Stem				
SMR	130415014-130415026	FINNED STEM SHORT	NO	METAL
SMR	130415110-130415130	CEMENTLESS FINNED MINI STEM Ti6AL4V	NO	METAL
SMR	130415140-130415240	FINNED STEM	NO	METAL
SMR	130615120-130615200	CEMENTED STEM	YES	METAL
SMR	130815134-130815166	REVISION STEM	NO	METAL
SMR	130915134-130915158	CEMENTED REVISION STEM	YES	METAL
SMR	131215200-131215240	REVISION STEM CEMENTED	YES	METAL
SMR	131315010-131315140	RESECTION STEM	NO	METAL
SMR	131515200-131515240	CEMENTED REVISION STEM	YES	METAL
Glenoid				
SMR L1	137520005-137520030	L1 METAL BACK GLENOID	NO	METAL
SMR L1	137520008-137520028	L1 METAL BACK GLENOID PEG	NO	METAL

Table 10: Revised Number of SMR/SMR L1 Primary Total Stemmed Reverse Shoulder Replacement by Catalogue Number Range

Humeral Stem Range	Glenoid Range	N Revised	N Total
130415014-130415026	137520005-137520030	0	21
130415110-130415130	137520005-137520030	39	597
130415140-130415240	137520005-137520030	468	11631
	137520008-137520028	0	9
130615120-130615200	137520005-137520030	17	321
130815134-130815166	137520005-137520030	16	105
130915134-130915158	137520005-137520030	2	30
131215200-131215240	137520005-137520030	0	4
131315010-131315140	137520005-137520030	0	2
131515200-131515240	137520005-137520030	0	1
TOTAL		542	12721