

ASR/ASR Total Resurfacing Hip Investigation

Note: This analysis compares the ASR/ASR head/acetabular combination with all other total resurfacing hip 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-2020>.

TABLE 1

Revision Rate of Primary Total Resurfacing Hip Replacement

The revision rate of the ASR/ASR total resurfacing hip combination is compared to all other total resurfacing hip prostheses.

Table 1: Revision Rates of Primary Total Resurfacing Hip Replacement

Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
ASR/ASR	392	1168	12402	3.16 (2.86, 3.49)
Other Total Resurfacing Hip	1455	17082	186159	0.78 (0.74, 0.82)
TOTAL	1847	18250	198561	0.93 (0.89, 0.97)

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Resurfacing Hip Replacement

The yearly cumulative percent revision of the ASR/ASR total resurfacing hip combination is compared to all other total resurfacing hip prostheses.

Table 2: Yearly Cumulative Percent Revision of Primary Total Resurfacing Hip Replacement

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs
ASR/ASR	3.4 (2.5, 4.6)	5.1 (4.0, 6.6)	7.2 (5.9, 8.8)	10.2 (8.6, 12.1)	15.4 (13.4, 17.6)	19.4 (17.2, 21.8)
Other Total Resurfacing Hip	1.6 (1.4, 1.8)	2.3 (2.1, 2.5)	2.9 (2.6, 3.2)	3.4 (3.2, 3.7)	4.1 (3.8, 4.4)	4.8 (4.5, 5.1)

CPR	7 Yrs	8 Yrs	9 Yrs	10 Yrs	11 Yrs	12 Yrs
ASR/ASR	23.0 (20.7, 25.5)	25.9 (23.5, 28.5)	27.8 (25.3, 30.5)	29.8 (27.2, 32.5)	31.2 (28.7, 34.0)	32.5 (29.9, 35.3)
Other Total Resurfacing Hip	5.5 (5.1, 5.8)	6.1 (5.8, 6.5)	6.8 (6.4, 7.2)	7.6 (7.2, 8.1)	8.2 (7.8, 8.7)	8.9 (8.5, 9.4)

CPR	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs
ASR/ASR	34.0 (31.3, 36.9)	35.3 (32.5, 38.2)	35.5 (32.7, 38.5)				
Other Total Resurfacing Hip	9.7 (9.2, 10.2)	10.2 (9.7, 10.8)	10.9 (10.3, 11.4)	11.5 (10.9, 12.1)	11.9 (11.3, 12.6)	12.3 (11.6, 13.1)	13.4 (12.2, 14.7)

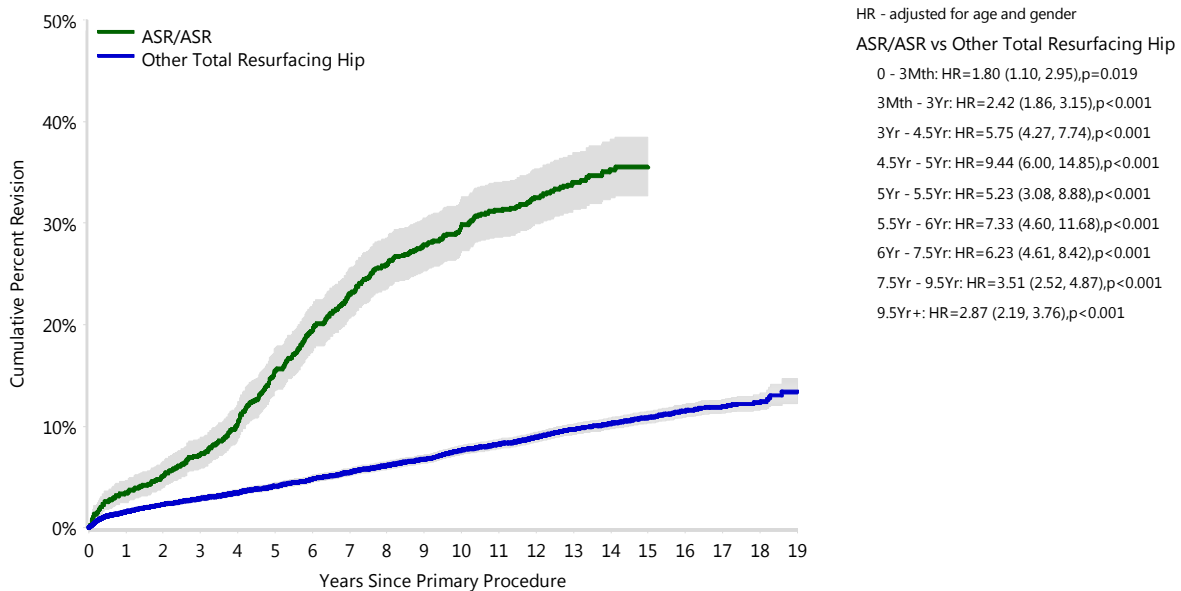
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Resurfacing Hip Replacement

The yearly cumulative percent revision of the ASR/ASR total resurfacing hip combination is compared to all other total resurfacing hip 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 Resurfacing Hip Replacement



Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs	9 Yrs
ASR/ASR	1168	1127	1105	1079	1041	981	931	887	843	817
Other Total Resurfacing Hip	17082	16274	15742	15228	14686	14178	13656	13117	12521	11832

Number at Risk	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs
ASR/ASR	792	701	598	472	314	134	30	0	0	0
Other Total Resurfacing Hip	10768	9636	8332	6939	5567	4191	2893	1701	621	85

TABLE 3**Primary Diagnosis for Revised Primary Total Resurfacing Hip 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 resurfacing hip prostheses.

Table 3: Primary Diagnosis for Revised Primary Total Resurfacing Hip Replacement

Primary Diagnosis	ASR/ASR		Other Total Resurfacing Hip	
	Number	Percent	Number	Percent
Osteoarthritis	356	90.8	1338	92.0
Developmental Dysplasia	29	7.4	60	4.1
Osteonecrosis	4	1.0	38	2.6
Other Inflammatory Arthritis			11	0.8
Rheumatoid Arthritis	2	0.5	7	0.5
Other	1	0.3	1	0.1
TOTAL	392	100.0	1455	100.0

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 Resurfacing Hip Replacement - Reason for Revision (Follow-up Limited to 16.4 Years)

Revision Diagnosis	Number	ASR/ASR		Other Total Resurfacing Hip		
		% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Loosening	59	5.1	15.1	411	2.4	28.5
Fracture	33	2.8	8.4	280	1.6	19.4
Metal Related Pathology	227	19.4	57.9	280	1.6	19.4
Lysis	23	2.0	5.9	147	0.9	10.2
Infection	17	1.5	4.3	97	0.6	6.7
Pain	20	1.7	5.1	89	0.5	6.2
Osteonecrosis	6	0.5	1.5	37	0.2	2.6
Prosthesis Dislocation	2	0.2	0.5	25	0.1	1.7
Malposition	1	0.1	0.3	22	0.1	1.5
Instability				8	0.0	0.6
Implant Breakage Acetabular	1	0.1	0.3	4	0.0	0.3
Implant Breakage Head	2	0.2	0.5	4	0.0	0.3
Progression Of Disease				4	0.0	0.3
Tumour				4	0.0	0.3
Leg Length Discrepancy				3	0.0	0.2
Wear Acetabulum				3	0.0	0.2
Synovitis				2	0.0	0.1
Heterotopic Bone				1	0.0	0.1
Incorrect Sizing				1	0.0	0.1
Other	1	0.1	0.3	18	0.1	1.3
N Revision	392	33.6	100.0	1440	8.4	100.0
N Primary	1168			17082		

Note: This table is restricted to revisions within 16.4 years for all groups to allow a time-matched comparison of revisions.

FIGURE 2

Cumulative Incidence Revision Diagnosis of Primary Total Resurfacing Hip 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 ASR/ASR total resurfacing hip combination. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total resurfacing hip prostheses.

Figure 2: Cumulative Incidence Revision Diagnosis for Primary Total Resurfacing Hip Replacement

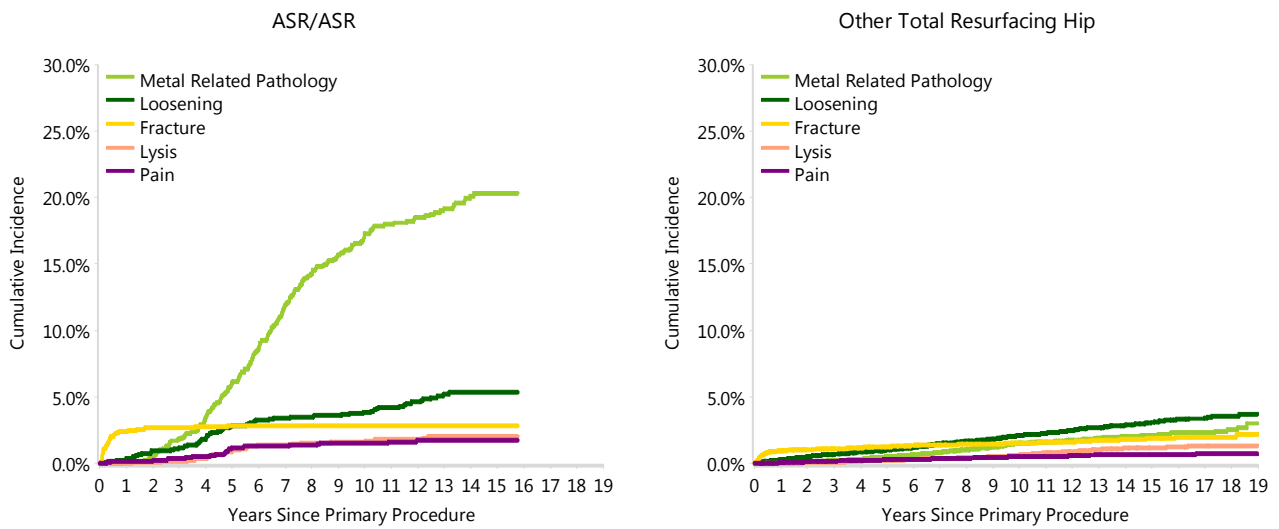


TABLE 5

Type of Revision Performed for Primary Total Resurfacing Hip Replacement

This analysis identifies the components used in the revision of the ASR/ASR total resurfacing hip combination and compares it to the components used in the revision of all other total resurfacing hip 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 resurfacing hip prostheses i.e. is there a difference in the type of revision undertaken for the ASR/ASR total resurfacing hip combination compared to all other total resurfacing hip prostheses.

Table 5: Primary Total Resurfacing Hip Replacement - Type of Revision (Follow-up Limited to 16.4 Years)

Type of Revision	ASR/ASR		Other Total Resurfacing Hip	
	Number	Percent	Number	Percent
THR (Femoral/Acetabular)	338	86.2	978	67.9
Femoral Component	45	11.5	369	25.6
Acetabular Component	6	1.5	46	3.2
Cement Spacer	2	0.5	38	2.6
Removal of Prostheses	1	0.3	9	0.6
N Major	392	100.0	1440	100.0
TOTAL	392	100.0	1440	100.0

Note: This table is restricted to revisions within 16.4 years for all groups to allow a time-matched comparison of revisions.

TABLE 6

Revision Rates of ASR/ASR Primary Total Resurfacing Hip 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: Revision Rates of ASR/ASR Primary Total Resurfacing Hip Replacement by Fixation

Fixation	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Cemented	1	9	107	0.94 (0.02, 5.22)
Hybrid (Femur Cemented)	391	1159	12295	3.18 (2.87, 3.51)
TOTAL	392	1168	12402	3.16 (2.86, 3.49)

TABLE 7

Revision Rates of Primary Total Resurfacing Hip Replacement by State

This enables a state by state variation to be identified for the ASR/ASR total resurfacing hip combination and provides the comparative data for each of the states for all other total resurfacing hip 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 7: Revision Rates of Primary Total Resurfacing Hip Replacement by State

Component	State	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
ASR/ASR	NSW	83	251	2696	3.08 (2.45, 3.82)
	VIC	75	245	2703	2.77 (2.18, 3.48)
	QLD	22	87	919	2.39 (1.50, 3.62)
	WA	2	3	29	6.80 (0.82, 24.55)
	SA	201	561	5864	3.43 (2.97, 3.94)
	TAS	1	4	38	2.64 (0.07, 14.71)
	ACT/NT	8	17	151	5.28 (2.28, 10.41)
Other Total Resurfacing Hip	NSW	444	5212	56761	0.78 (0.71, 0.86)
	VIC	485	5751	68809	0.70 (0.64, 0.77)
	QLD	261	3576	33270	0.78 (0.69, 0.89)
	WA	71	878	7303	0.97 (0.76, 1.23)
	SA	123	847	10878	1.13 (0.94, 1.35)
	TAS	16	101	1139	1.40 (0.80, 2.28)
	ACT/NT	55	717	7999	0.69 (0.52, 0.89)
TOTAL		1847	18250	198561	0.93 (0.89, 0.97)

TABLE 8**Number of Revisions of ASR/ASR Primary Total Resurfacing Hip Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the ASR/ASR total resurfacing hip 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 2019 has a maximum of one year to be revised, whereas a primary procedure performed in 2017 has a maximum of three years to be revised.

Table 8: Number of Revisions of ASR/ASR Primary Total Resurfacing Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2003	10	43
2004	55	165
2005	99	302
2006	105	258
2007	62	176
2008	43	133
2009	18	91
TOTAL	392	1168

TABLE 9

Revision Rates of ASR/ASR Primary Total Resurfacing Hip 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 ASR/ASR 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	Coating	Fixation
Head						
ASR	999801532-999801556	MOM RS FEMORAL HEAD	YES	METAL		
ASR	999803239-999805763	ASR TOTAL FEMORAL IMPLANT	YES	METAL		
Acetabular						
ASR	999800044-999800070	MOM RS STANDARD ACETABULAR CUP	NO	METAL		POROUS
ASR	999803944-999806370	ASR TOTAL ACETABULAR IMPLANT	NO	METAL	HA COATED	

Table 9: Revision Rates of ASR/ASR Primary Total Resurfacing Hip Replacement by Catalogue Number Range

Head Range	Acetabular Range	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
999801532-999801556	999800044-999800070	16	59	804	1.99 (1.14, 3.23)
999803239-999805763	999803944-999806370	376	1109	11598	3.24 (2.92, 3.59)
TOTAL		392	1168	12402	3.16 (2.86, 3.49)