

## MSA Total Conventional Hip Investigation

Note: This analysis compares the MSA femoral stem prosthesis with all other total conventional hip prostheses.

This prosthesis 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-2024>.

Note: Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator. Procedures using prostheses with no recorded use in 2023 are excluded from the comparator.

### TABLE 1

#### Revision Rate of Primary Total Conventional Hip Replacement

The revision rate of the MSA total conventional hip prosthesis is compared to all other total conventional hip prostheses.

**Table 1: Revision Rates of Primary Total Conventional Hip Replacement**

Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
MSA	43	224	2254	1.91 (1.38, 2.57)
Other Total Conventional Hip	19249	538541	3454641	0.56 (0.55, 0.57)
<b>TOTAL</b>	<b>19292</b>	<b>538765</b>	<b>3456895</b>	<b>0.56 (0.55, 0.57)</b>

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 2

**Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement**

The yearly cumulative percent revision of the MSA total conventional hip prosthesis is compared to all other total conventional hip prostheses.

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

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs
MSA	5.8 (3.4, 9.8)	8.5 (5.5, 13.1)	9.5 (6.3, 14.1)	10.4 (7.0, 15.2)	11.3 (7.8, 16.3)	11.3 (7.8, 16.3)	12.3 (8.6, 17.4)	14.7 (10.7, 20.2)
Other Total Conventional Hip	1.7 (1.7, 1.8)	2.2 (2.1, 2.2)	2.5 (2.5, 2.5)	2.8 (2.7, 2.8)	3.1 (3.0, 3.1)	3.3 (3.3, 3.4)	3.6 (3.6, 3.7)	3.9 (3.8, 4.0)

CPR	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs
MSA	16.3 (11.9, 21.9)	17.8 (13.3, 23.6)	18.4 (13.8, 24.3)	19.9 (15.0, 26.1)	19.9 (15.0, 26.1)			
Other Total Conventional Hip	4.2 (4.2, 4.3)	4.5 (4.5, 4.6)	4.9 (4.8, 5.0)	5.3 (5.2, 5.4)	5.7 (5.6, 5.8)	6.1 (5.9, 6.2)	6.5 (6.3, 6.6)	6.9 (6.7, 7.0)

CPR	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs	23 Yrs
MSA							
Other Total Conventional Hip	7.3 (7.1, 7.4)	7.7 (7.5, 7.8)	8.2 (8.0, 8.4)	8.5 (8.2, 8.7)	9.0 (8.7, 9.3)	9.7 (9.2, 10.1)	10.3 (9.5, 11.2)

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

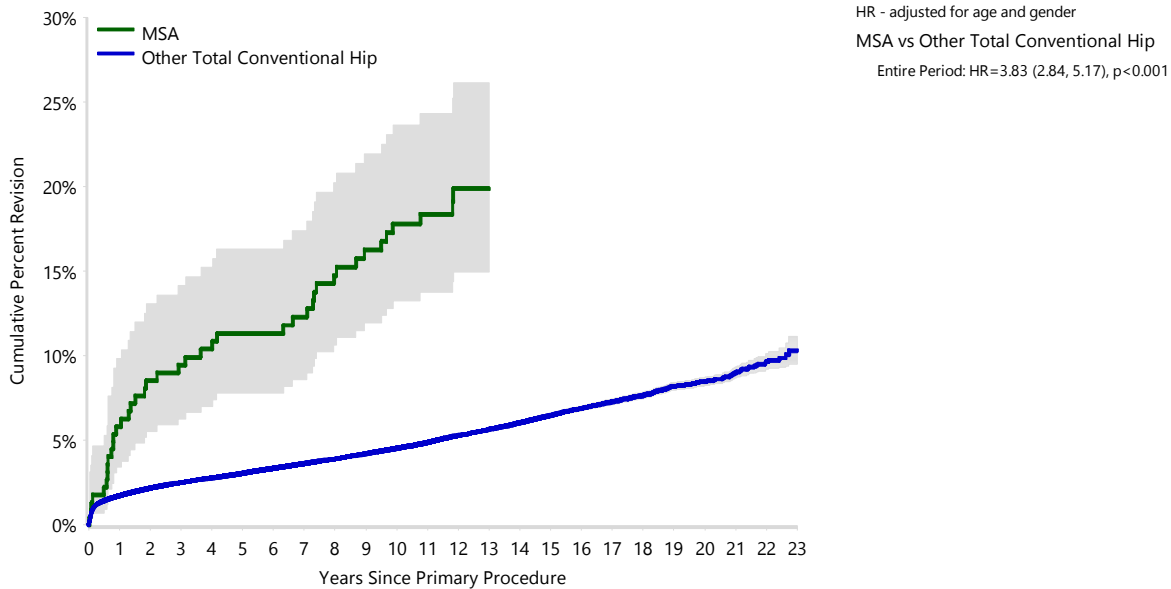
**FIGURE 1**

**Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement**

The yearly cumulative percent revision of the MSA total conventional hip prosthesis is compared to all other total conventional 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 Conventional 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	10 Yrs	11 Yrs
MSA	224	210	201	196	193	189	185	179	172	166	158	139
Other Total Conventional Hip	538541	475645	425806	377168	332911	288979	247789	209621	174574	143301	117825	96251

Number at Risk	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs	23 Yrs
MSA	101	48	7	2	1	0	0	0	0	0	0	0
Other Total Conventional Hip	77815	61602	47695	35979	26857	20094	14821	10048	6170	3221	1205	203

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

**TABLE 3****Primary Diagnosis for Revised Primary Total Conventional 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 conventional hip prostheses.

**Table 3: Primary Diagnosis for Revised Primary Total Conventional Hip Replacement**

Primary Diagnosis	MSA		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Osteoarthritis	43	100.0	15951	82.9
Fractured Neck Of Femur			1420	7.4
Osteonecrosis			859	4.5
Developmental Dysplasia			320	1.7
Rheumatoid Arthritis			208	1.1
Failed Internal Fixation			151	0.8
Tumour			149	0.8
Other Inflammatory Arthritis			106	0.6
Fracture/Dislocation			53	0.3
Other			17	0.1
Arthrodesis Takedown			15	0.1
<b>TOTAL</b>	<b>43</b>	<b>100.0</b>	<b>19249</b>	<b>100.0</b>

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm 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 Conventional Hip Replacement - Reason for Revision (Follow-up Limited to 16 Years)

Revision Diagnosis	Number	MSA		Other Total Conventional Hip		
		% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	3	1.3	7.0	4474	0.8	23.6
Prosthesis Dislocation/Instability	2	0.9	4.7	4344	0.8	22.9
Fracture	4	1.8	9.3	4201	0.8	22.2
Loosening	18	8.0	41.9	3726	0.7	19.7
Pain	1	0.4	2.3	334	0.1	1.8
Leg Length Discrepancy				291	0.1	1.5
Malposition	1	0.4	2.3	266	0.0	1.4
Lysis	1	0.4	2.3	193	0.0	1.0
Implant Breakage Stem				185	0.0	1.0
Implant Breakage Acetabular Insert				130	0.0	0.7
Incorrect Sizing				103	0.0	0.5
Wear Acetabular Insert				98	0.0	0.5
Metal Related Pathology	12	5.4	27.9	76	0.0	0.4
Implant Breakage Acetabular				71	0.0	0.4
Wear Head				46	0.0	0.2
Tumour				43	0.0	0.2
Implant Breakage Head				31	0.0	0.2
Heterotopic Bone				26	0.0	0.1
Wear Acetabulum				10	0.0	0.1
Osteonecrosis				2	0.0	0.0
Progression Of Disease				2	0.0	0.0
Synovitis				1	0.0	0.0
Other	1	0.4	2.3	292	0.1	1.5
<b>N Revision</b>	<b>43</b>	<b>19.2</b>	<b>100.0</b>	<b>18945</b>	<b>3.5</b>	<b>100.0</b>
<b>N Primary</b>	<b>224</b>			<b>538541</b>		

Note: This table is restricted to revisions within 16 years for all groups to allow a time-matched comparison of revisions.

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**FIGURE 2**

**Cumulative Incidence Revision Diagnosis of Primary Total Conventional 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 MSA total conventional hip prosthesis. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total conventional hip prostheses.

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

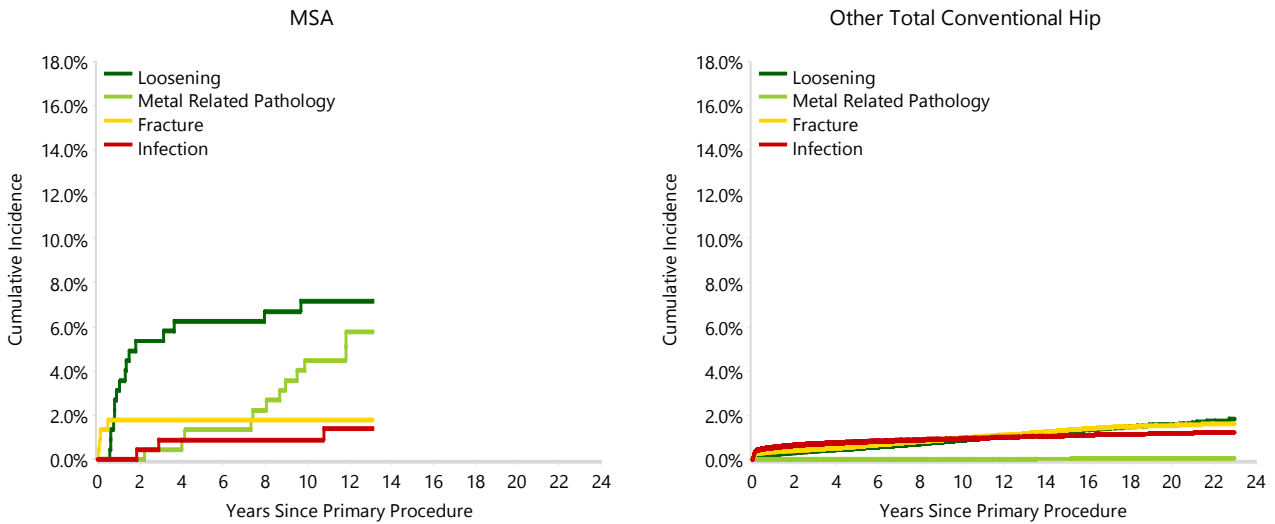


TABLE 5

**Type of Revision Performed for Primary Total Conventional Hip Replacement**

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

**Table 5: Primary Total Conventional Hip Replacement - Type of Revision (Follow-up Limited to 16 Years)**

Type of Revision	MSA		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Femoral Component	21	48.8	6270	33.1
Acetabular Component	6	14.0	3516	18.6
THR (Femoral/Acetabular)	13	30.2	2185	11.5
Cement Spacer	1	2.3	618	3.3
Removal of Prostheses			98	0.5
Reinsertion of Components			28	0.1
Total Femoral			9	0.0
Bipolar Head and Femoral			7	0.0
Saddle			1	0.0
<b>N Major</b>	<b>41</b>	<b>95.3</b>	<b>12732</b>	<b>67.2</b>
Head/Insert			4795	25.3
Head Only	2	4.7	921	4.9
Minor Components			307	1.6
Insert Only			186	1.0
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
<b>N Minor</b>	<b>2</b>	<b>4.7</b>	<b>6213</b>	<b>32.8</b>
<b>TOTAL</b>	<b>43</b>	<b>100.0</b>	<b>18945</b>	<b>100.0</b>

Note: This table is restricted to revisions within 16 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

**TABLE 6****Revision Rates of MSA Primary Total Conventional 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: Revised Number of MSA Primary Total Conventional Hip Replacement by Fixation**

Fixation	N Revised	N Total
Cementless	43	224
<b>TOTAL</b>	<b>43</b>	<b>224</b>

**TABLE 7****Revision Rates of MSA Primary Total Conventional Hip 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 prosthesis are listed.

**Table 7: Revised Number of MSA Primary Total Conventional Hip Replacement by Bearing Surface**

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	19	143
Ceramic/Non XLPE	0	1
Ceramic/XLPE	0	2
Metal/Metal	18	39
Metal/XLPE	6	39
<b>TOTAL</b>	<b>43</b>	<b>224</b>



**TABLE 8****Revision Rates of Primary Total Conventional Hip Replacement by State**

This enables a state by state variation to be identified for the MSA total conventional hip prosthesis and provides the comparative data for each of the states for all other total conventional 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 8: Revised Number of Primary Total Conventional Hip Replacement by State**

Component	State	N Revised	N Total
MSA	NSW	37	180
	VIC	6	43
	WA	0	1
Other Total Conventional Hip	NSW	5207	157707
	VIC	4859	140681
	QLD	3791	94582
	WA	2546	63265
	SA	1825	49398
	TAS	452	18198
	ACT/NT	569	14710
<b>TOTAL</b>		<b>19292</b>	<b>538765</b>

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

**TABLE 9****Number of Revisions of MSA Primary Total Conventional Hip Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the MSA total conventional hip prosthesis. 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 2023 has a maximum of one year to be revised, whereas a primary procedure performed in 2021 has a maximum of three years to be revised.

**Table 9: Number of Revisions of MSA Primary Total Conventional Hip Replacement by Year of Implant**

Year of Implant	Number Revised	Total Number
2007	1	2
2008	2	3
2009	6	11
2010	9	57
2011	12	77
2012	8	46
2013	3	21
2014	2	7
<b>TOTAL</b>	<b>43</b>	<b>224</b>

TABLE 10

**Revision Rates of MSA Primary Total Conventional 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 MSA 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	Stem Type	Coating
<b>Femoral Stem</b>						
MSA	GH140000-GH1400025	TITANIUM HA CUSTOM FEMORAL STEM	NO	METAL	REQUIRES FEMNECK	HA COATED

**Table 10: Revised Number of MSA Primary Total Conventional Hip Replacement by Catalogue Number Range**

Femoral Stem Range	N Revised	N Total
GH140000-GH1400025	43	224
<b>TOTAL</b>	<b>43</b>	<b>224</b>

**TABLE 11****Revision Rates of MSA Primary Total Conventional Hip Replacement by Component**

A prosthesis may be combined with multiple components. This analysis has been undertaken to determine if the revision rate varies according to the component with which it is combined.

**Table 11: Revised Number of MSA Primary Total Conventional Hip Replacement by Acetabular Component**

Acetabular Component	N Revised	N Total
Acetabular Shell (Global)	2	7
BHR	0	1
BSC-Cup	0	11
Cormet	0	1
Cotyle	0	1
Delta-TT	1	4
Fin II	13	104
Icon	18	37
Procotyl L	9	58
<b>TOTAL</b>	<b>43</b>	<b>224</b>