MBA (exch neck)/PINNACLE Total Conventional Hip Investigation

Note: This analysis compares the MBA (exch neck)/PINNACLE femoral stem/acetabular combination with all other total conventional 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-2022.

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 2021 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Conventional Hip Replacement

The revision rate of the MBA (exch neck)/PINNACLE total conventional hip combination 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)
MBA (exch neck)/PINNACLE	27	225	1959	1.38 (0.91, 2.01)
Other Total Conventional Hip	15859	453455	2721137	0.58 (0.57, 0.59)
TOTAL	**15886**	**453680**	**2723096**	**0.58 (0.57, 0.59)**

Note: Prostheses no longer used in 2021 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 MBA (exch neck)/PINNACLE total conventional hip combination 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
MBA (exch neck)/PINNACLE	2.2 (0.9, 5.3)	2.7 (1.2, 5.8)	3.6 (1.8, 7.1)	4.6 (2.5, 8.4)	7.6 (4.7, 12.1)	9.2 (5.9, 14.0)	9.7 (6.4, 14.7)
Other Total Conventional Hip	1.7 (1.7, 1.8)	2.2 (2.2, 2.2)	2.5 (2.5, 2.6)	2.8 (2.8, 2.9)	3.1 (3.0, 3.2)	3.4 (3.3, 3.5)	3.7 (3.6, 3.7)

CPR	8 Yrs	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs
MBA (exch neck)/PINNACLE	12.0 (8.2, 17.4)	12.6 (8.6, 18.1)	13.5 (9.3, 19.3)	13.5 (9.3, 19.3)			
Other Total Conventional Hip	4.0 (3.9, 4.0)	4.3 (4.2, 4.4)	4.6 (4.6, 4.7)	5.0 (4.9, 5.1)	5.4 (5.3, 5.5)	5.8 (5.7, 5.9)	6.3 (6.1, 6.4)

CPR	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs
MBA (exch neck)/PINNACLE							
Other Total Conventional Hip	6.7 (6.5, 6.8)	7.1 (6.9, 7.3)	7.5 (7.3, 7.7)	7.9 (7.6, 8.1)	8.6 (8.3, 8.9)	8.9 (8.5, 9.3)	9.8 (9.0, 10.8)

Note: Prostheses no longer used in 2021 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

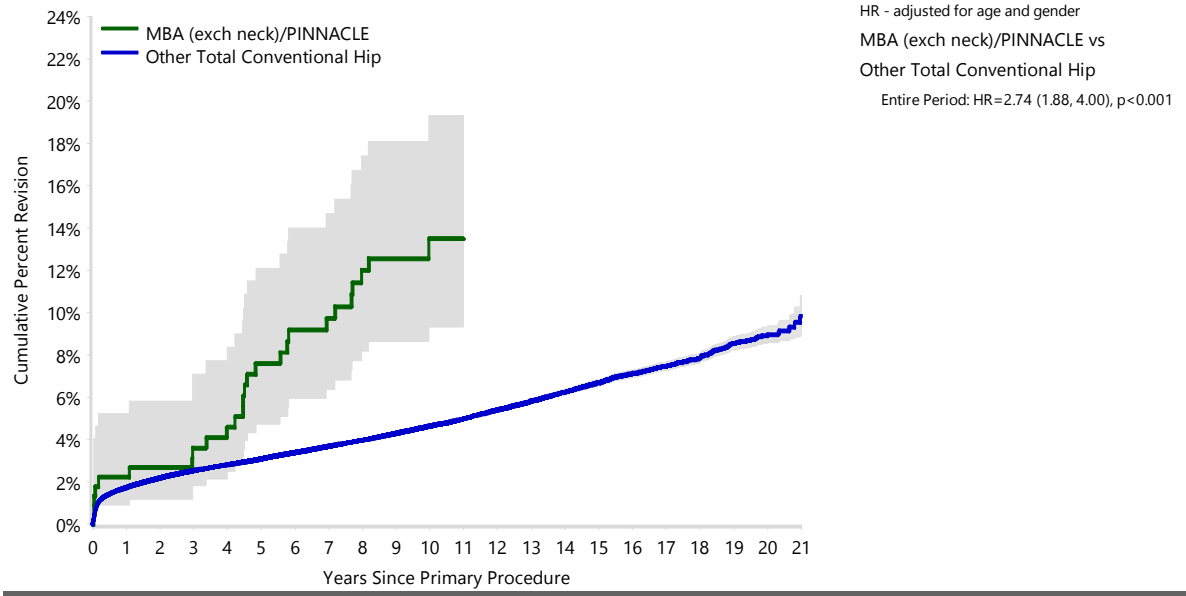
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the MBA (exch neck)/PINNACLE total conventional hip combination 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
MBA (exch neck)/PINNACLE	225	218	210	204	194	178	172	163	154	112	94
Other Total Conventional Hip	453455	398683	354053	309177	267205	228060	191587	158583	131210	108026	88155

Number at Risk	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs
MBA (exch neck)/PINNACLE	61	39	33	12	0	0	0	0	0	0	0
Other Total Conventional Hip	70603	55343	42208	31909	24032	17719	12212	7611	4006	1573	276

Note: Prostheses no longer used in 2021 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

	MBA (exch neck)/PINNACLE		Other Total Conventional Hip	
Primary Diagnosis	Number	Percent	Number	Percent
Osteoarthritis	23	85.2	13112	82.7
Fractured Neck Of Femur	4	14.8	1164	7.3
Osteonecrosis			718	4.5
Developmental Dysplasia			247	1.6
Rheumatoid Arthritis			173	1.1
Failed Internal Fixation			140	0.9
Tumour			137	0.9
Other Inflammatory Arthritis			91	0.6
Fracture/Dislocation			47	0.3
Arthrodesis Takedown			16	0.1
Other			14	0.1
TOTAL	**27**	**100.0**	**15859**	**100.0**

Note: Prostheses no longer used in 2021 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 14.5 Years)

	MBA (exch neck)/PINNACLE			Other Total Conventional Hip		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Prosthesis Dislocation/Instability	4	1.8	14.8	3676	0.8	23.6
Infection				3519	0.8	22.6
Fracture	13	5.8	48.1	3362	0.7	21.6
Loosening	2	0.9	7.4	3134	0.7	20.2
Pain				282	0.1	1.8
Leg Length Discrepancy				260	0.1	1.7
Malposition				225	0.0	1.4
Lysis				160	0.0	1.0
Implant Breakage Stem				144	0.0	0.9
Implant Breakage Acetabular Insert				113	0.0	0.7
Incorrect Sizing				95	0.0	0.6
Wear Acetabular Insert				79	0.0	0.5
Implant Breakage Acetabular				65	0.0	0.4
Metal Related Pathology	8	3.6	29.6	62	0.0	0.4
Wear Head				44	0.0	0.3
Tumour				36	0.0	0.2
Implant Breakage Head				29	0.0	0.2
Heterotopic Bone				23	0.0	0.1
Wear Acetabulum				9	0.0	0.1
Progression Of Disease				2	0.0	0.0
Osteonecrosis				1	0.0	0.0
Synovitis				1	0.0	0.0
Other				228	0.1	1.5
N Revision	**27**	**12.0**	**100.0**	**15549**	**3.4**	**100.0**
N Primary	**225**			**453455**		

Note: This table is restricted to revisions within 14.5 years for all groups to allow a time-matched comparison of revisions.
Note: Prostheses no longer used in 2021 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

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 MBA (exch neck)/PINNACLE total conventional hip combination. 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

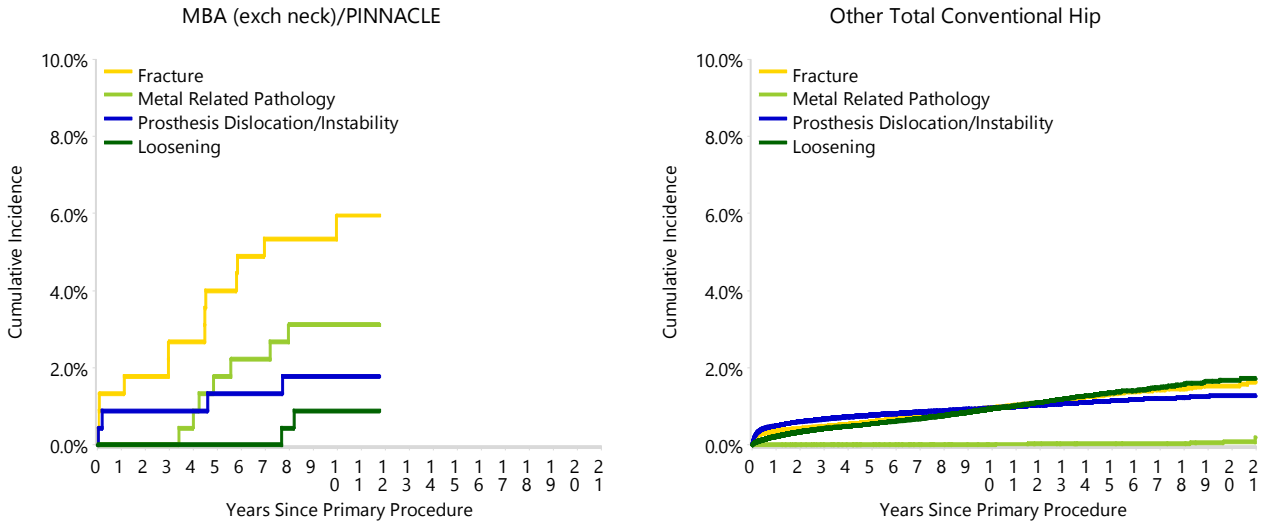


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the MBA (exch neck)/PINNACLE total conventional hip combination 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 MBA (exch neck)/PINNACLE total conventional hip combination compared to all other total conventional hip prostheses.

Table 5: Primary Total Conventional Hip Replacement - Type of Revision (Follow-up Limited to 14.5 Years)

	MBA (exch neck)/PINNACLE		Other Total Conventional Hip	
Type of Revision	Number	Percent	Number	Percent
Femoral Component	19	70.4	5066	32.6
Acetabular Component			2971	19.1
THR (Femoral/Acetabular)	2	7.4	1750	11.3
Cement Spacer	1	3.7	588	3.8
Removal of Prostheses			95	0.6
Reinsertion of Components			25	0.2
Total Femoral			6	0.0
Bipolar Head and Femoral			4	0.0
Saddle			1	0.0
N Major	**22**	**81.5**	**10506**	**67.6**
Head/Insert			3823	24.6
Head Only			775	5.0
Minor Components	3	11.1	270	1.7
Insert Only			171	1.1
Bipolar Only			2	0.0
Head/Neck	2	7.4	1	0.0
Cement Only			1	0.0
N Minor	**5**	**18.5**	**5043**	**32.4**
TOTAL	**27**	**100.0**	**15549**	**100.0**

Note: This table is restricted to revisions within 14.5 years for all groups to allow a time-matched comparison of revisions.
Note: Prostheses no longer used in 2021 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 MBA (exch neck)/PINNACLE 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 MBA (exch neck)/PINNACLE Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cementless	27	225
TOTAL	**27**	**225**

TABLE 7

Revision Rates of MBA (exch neck)/PINNACLE 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 combination are listed.

Table 7: Revised Number of MBA (exch neck)/PINNACLE Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	27	225
TOTAL	**27**	**225**

TABLE 8

Revision Rates of Primary Total Conventional Hip Replacement by State

This enables a state by state variation to be identified for the MBA (exch neck)/PINNACLE total conventional hip combination 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
MBA (exch neck)/PINNACLE	NSW	27	225
Other Total Conventional Hip	NSW	4298	132969
	VIC	3982	116998
	QLD	3146	80122
	WA	2184	53952
	SA	1415	41929
	TAS	372	15098
	ACT/NT	462	12387
TOTAL		**15886**	**453680**

Note: Prostheses no longer used in 2021 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 MBA (exch neck)/PINNACLE Primary Total Conventional Hip Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the MBA (exch neck)/PINNACLE total conventional 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 2021 has a maximum of one year to be revised, whereas a primary procedure performed in 2019 has a maximum of three years to be revised.

Table 9: Number of Revisions of MBA (exch neck)/PINNACLE Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2007	3	24
2008	6	45
2009	1	9
2010	9	43
2011	3	46
2012	2	14
2013	3	44
TOTAL	**27**	**225**

TABLE 10

Revision Rates of MBA (exch neck)/PINNACLE 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 MBA (exch neck)/PINNACLE 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	Fixation
Femoral Stem							
MBA (exch neck)	130000102-130000107	MBA STEM HAP	NO	METAL	REQUIRES FEMNECK	HA COATED	
MBA (exch neck)	HL130000102-HL130001107	TITANIUM GRIT BLAST W/HA MODULAR STEM	NO	METAL	REQUIRES FEMNECK	HA COATED	
Acetabular							
PINNACLE	121712048-121712066	SECTOR ACETABULAR CUP W/DUOFIX HA	NO	METAL		HA COATED	
PINNACLE	121720048-121720072	MULTIHOLE ACETABULAR SHELL W/POROCOAT	NO	METAL			POROUS

Table 10: Revised Number of MBA (exch neck)/PINNACLE Primary Total Conventional Hip Replacement by Catalogue Number Range

Femoral Stem Range	Acetabular Range	N Revised	N Total
130000102-130000107	121712048-121712066	1	2
HL130000102-HL130001107	121712048-121712066	26	222
	121720048-121720072	0	1
TOTAL		**27**	**225**