

CPT/Low Profile Cup Total Conventional Hip Investigation

Note: This analysis compares the CPT/Low Profile Cup 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 CPT/Low Profile Cup 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)
CPT/Low Profile Cup	16	204	1098	1.46 (0.83, 2.37)
Other Total Conventional Hip	15843	453251	2720039	0.58 (0.57, 0.59)
TOTAL	15859	453455	2721137	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 CPT/Low Profile Cup 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
CPT/Low Profile Cup	5.5 (3.1, 9.6)	6.0 (3.4, 10.3)	6.6 (3.9, 11.1)	8.3 (5.0, 13.6)	9.2 (5.7, 14.9)	9.2 (5.7, 14.9)	9.2 (5.7, 14.9)
Other Total Conventional Hip	1.7 (1.7, 1.8)	2.2 (2.1, 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
CPT/Low Profile Cup	9.2 (5.7, 14.9)	9.2 (5.7, 14.9)					
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)	6.2 (6.1, 6.4)

CPR	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs
CPT/Low Profile Cup							
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.

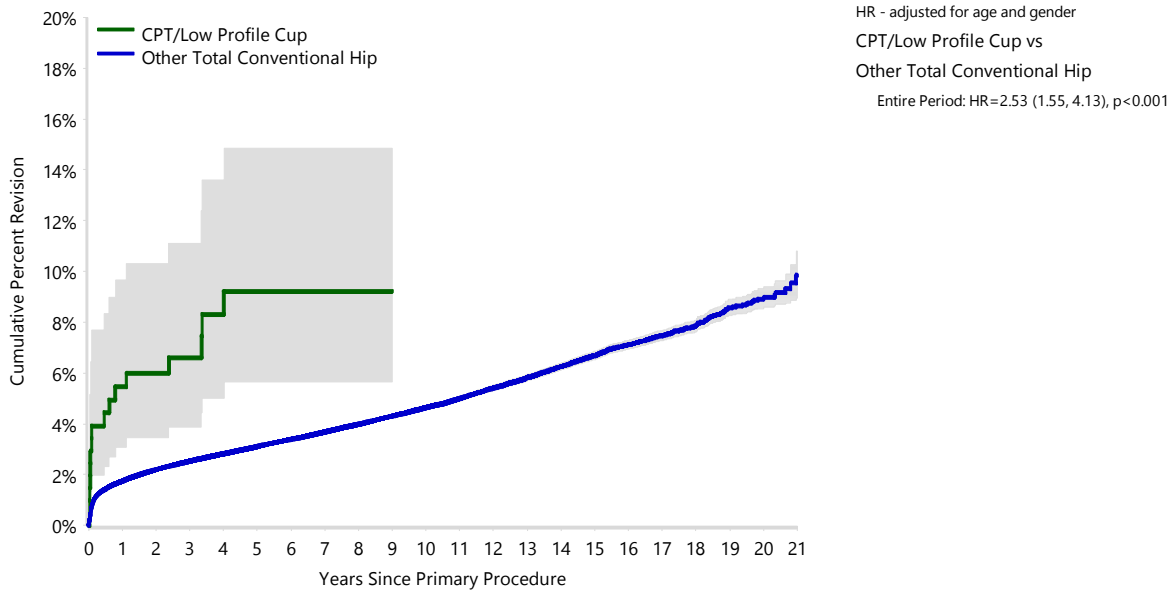
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the CPT/Low Profile Cup 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
CPT/Low Profile Cup	204	180	164	122	101	94	83	75	61	45	29
Other Total Conventional Hip	453251	398503	353889	309055	267104	227966	191504	158508	131149	107981	88126

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
CPT/Low Profile Cup	16	10	6	5	5	5	3	0	0	0	0
Other Total Conventional Hip	70587	55333	42202	31904	24027	17714	12209	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

Primary Diagnosis	CPT/Low Profile Cup		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Osteoarthritis	11	68.8	13101	82.7
Fractured Neck Of Femur	4	25.0	1160	7.3
Osteonecrosis	1	6.3	717	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	16	100.0	15843	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 17.5 Years)

Revision Diagnosis	CPT/Low Profile Cup			Other Total Conventional Hip		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Prosthesis Dislocation/Instability	5	2.5	31.3	3702	0.8	23.5
Infection	5	2.5	31.3	3536	0.8	22.4
Fracture	5	2.5	31.3	3420	0.8	21.7
Loosening	1	0.5	6.3	3204	0.7	20.3
Pain				286	0.1	1.8
Leg Length Discrepancy				260	0.1	1.6
Malposition				225	0.0	1.4
Lysis				177	0.0	1.1
Implant Breakage Stem				149	0.0	0.9
Implant Breakage Acetabular Insert				114	0.0	0.7
Incorrect Sizing				95	0.0	0.6
Wear Acetabular Insert				88	0.0	0.6
Implant Breakage Acetabular				66	0.0	0.4
Metal Related Pathology				65	0.0	0.4
Wear Head				44	0.0	0.3
Tumour				37	0.0	0.2
Implant Breakage Head				30	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	1.4
N Revision	16	7.8	100.0	15762	3.5	100.0
N Primary	204			453251		

Note: This table is restricted to revisions within 17.5 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 CPT/Low Profile Cup 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

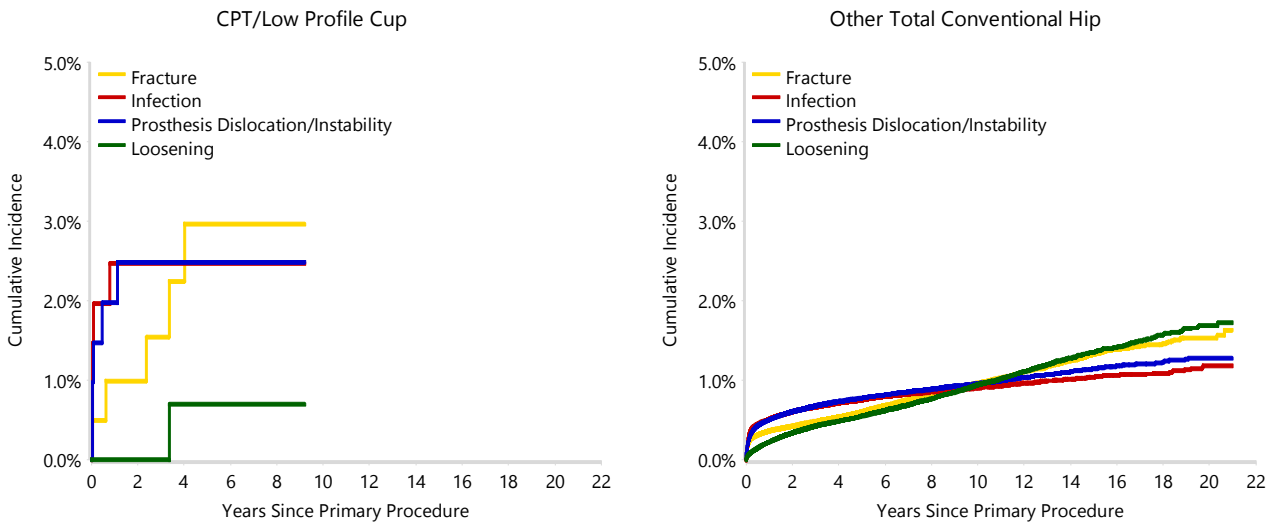


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the CPT/Low Profile Cup 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 CPT/Low Profile Cup 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 17.5 Years)

Type of Revision	CPT/Low Profile Cup		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Femoral Component	7	43.8	5132	32.6
Acetabular Component	2	12.5	3031	19.2
THR (Femoral/Acetabular)	1	6.3	1794	11.4
Cement Spacer	1	6.3	592	3.8
Removal of Prostheses			96	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	11	68.8	10681	67.8
Head/Insert			3860	24.5
Head Only	5	31.3	772	4.9
Minor Components			273	1.7
Insert Only			172	1.1
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	5	31.3	5081	32.2
TOTAL	16	100.0	15762	100.0

Note: This table is restricted to revisions within 17.5 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 CPT/Low Profile Cup 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 CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cemented	16	204
TOTAL	16	204

TABLE 7**Revision Rates of CPT/Low Profile Cup 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 CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Non XLPE	3	39
Metal/Non XLPE	13	165
TOTAL	16	204

TABLE 8**Revision Rates of CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Approach**

This analysis is provided as some prostheses are used with a variety of surgical approaches. All surgical approaches used with this combination are listed.

Table 8: Revised Number of CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	0	1
Lateral	0	14
Posterior	5	58
TOTAL	5	73

Note: Excludes 131 procedures with no approach recorded

TABLE 9

Revision Rates of Primary Total Conventional Hip Replacement by State

This enables a state by state variation to be identified for the CPT/Low Profile Cup 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 9: Revised Number of Primary Total Conventional Hip Replacement by State

Component	State	N Revised	N Total
CPT/Low Profile Cup	NSW	15	192
	VIC	1	7
	WA	0	2
	SA	0	1
	TAS	0	1
	ACT/NT	0	1
Other Total Conventional Hip	NSW	4283	132777
	VIC	3981	116991
	QLD	3146	80122
	WA	2184	53950
	SA	1415	41928
	TAS	372	15097
	ACT/NT	462	12386
TOTAL		15859	453455

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 10**Number of Revisions of CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the CPT/Low Profile Cup 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 10: Number of Revisions of CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2004	1	15
2005	0	9
2006	2	8
2007	1	7
2008	1	7
2009	0	6
2010	1	9
2011	0	16
2012	3	26
2013	1	20
2014	1	6
2015	0	5
2016	0	2
2017	0	3
2018	0	15
2019	2	31
2020	3	11
2021	0	8
TOTAL	16	204

TABLE 11

Revision Rates of CPT/Low Profile Cup 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 CPT/Low Profile Cup 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	Fixation
Femoral Stem					
CPT	00811400000-00811405000	ZIMALOY COCR POLISHED TAPERED STANDARD OFFSET FEMORAL STEM	YES	METAL	POLISHED
CPT	00811400010-00811400510	ZIMALOY COCR POLISHED TAPER EXTENDED OFFSET FEMORAL STEM	YES	METAL	POLISHED
CPT	00811400218-00811400218	ZIMALOY COCR POLISHED TAPER STANDARD OFFSET LONG FEMORAL STEM	YES	METAL	POLISHED
CPT	00811400230-00811400530	ZIMALOY COCR POLISHED TAPER EXTRA EXTENDED OFFSET FEMORAL STEM	YES	METAL	POLISHED
Acetabular					
Low Profile Cup	632236-633264	PE LOW PROFILE CUP CEMENTED	YES	NON CROSS-LINKED POLYETHYLENE	

Table 11: Revised Number of CPT/Low Profile Cup Primary Total Conventional Hip Replacement by Catalogue Number Range

Femoral Stem Range	Acetabular Range	N Revised	N Total
00811400000-00811405000	632236-633264	9	120
00811400010-00811400510	632236-633264	6	80
00811400218-00811400218	632236-633264	0	3
00811400230-00811400530	632236-633264	1	1
TOTAL		16	204