

CPT/G7 Total Conventional Hip Investigation

Note: This analysis compares the CPT/G7 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-2023>.

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 2022 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Conventional Hip Replacement

The revision rate of the CPT/G7 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/G7	85	3172	5872	1.45 (1.16, 1.79)
Other Total Conventional Hip	17367	490973	3075590	0.56 (0.56, 0.57)
TOTAL	17452	494145	3081462	0.57 (0.56, 0.57)

Note: Prostheses no longer used in 2022 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/G7 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	8 Yrs
CPT/G7	2.6 (2.0, 3.2)	3.0 (2.4, 3.7)	3.3 (2.6, 4.1)	3.4 (2.7, 4.4)	3.4 (2.7, 4.4)			
Other Total Conventional Hip	1.7 (1.7, 1.8)	2.2 (2.1, 2.2)	2.5 (2.5, 2.6)	2.8 (2.7, 2.8)	3.1 (3.0, 3.1)	3.4 (3.3, 3.4)	3.6 (3.6, 3.7)	3.9 (3.9, 4.0)

CPR	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs
CPT/G7							
Other Total Conventional Hip	4.3 (4.2, 4.3)	4.6 (4.5, 4.7)	4.9 (4.8, 5.0)	5.3 (5.2, 5.4)	5.7 (5.6, 5.8)	6.1 (6.0, 6.2)	6.5 (6.4, 6.6)

CPR	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs
CPT/G7							
Other Total Conventional Hip	6.9 (6.8, 7.1)	7.3 (7.1, 7.4)	7.6 (7.4, 7.8)	8.2 (8.0, 8.5)	8.5 (8.2, 8.8)	8.9 (8.5, 9.3)	9.3 (8.8, 9.8)

Note: Prostheses no longer used in 2022 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

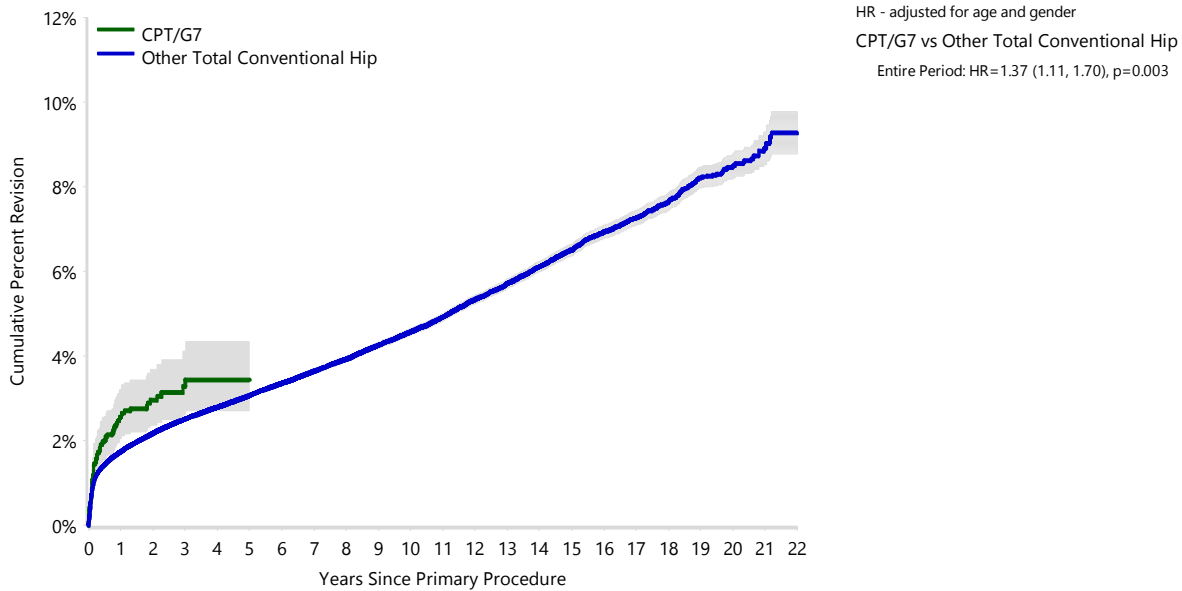
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the CPT/G7 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	11 Yrs
CPT/G7	3172	2154	1273	623	276	104	24	0	0	0	0	0
Other Total Conventional Hip	490973	435346	387444	343597	299384	257960	219287	183514	151369	124924	102632	83483

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
CPT/G7	0	0	0	0	0	0	0	0	0	0	0
Other Total Conventional Hip	66659	51987	39538	29740	22330	16535	11402	7013	3737	1435	252

Note: Prostheses no longer used in 2022 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/G7		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Osteoarthritis	50	58.8	14382	82.8
Fractured Neck Of Femur	21	24.7	1270	7.3
Osteonecrosis	5	5.9	792	4.6
Developmental Dysplasia	3	3.5	276	1.6
Rheumatoid Arthritis			186	1.1
Failed Internal Fixation	1	1.2	146	0.8
Tumour	1	1.2	144	0.8
Other Inflammatory Arthritis	2	2.4	97	0.6
Fracture/Dislocation	1	1.2	45	0.3
Arthrodesis Takedown			16	0.1
Other	1	1.2	13	0.1
TOTAL	85	100.0	17367	100.0

Note: Prostheses no longer used in 2022 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 7 Years)

Revision Diagnosis	Number	CPT/G7		Other Total Conventional Hip		
		% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	18	0.6	21.2	3675	0.7	25.5
Prosthesis Dislocation/Instability	29	0.9	34.1	3587	0.7	24.9
Fracture	29	0.9	34.1	2990	0.6	20.7
Loosening	5	0.2	5.9	2612	0.5	18.1
Pain	1	0.0	1.2	271	0.1	1.9
Leg Length Discrepancy				264	0.1	1.8
Malposition				223	0.0	1.5
Incorrect Sizing				100	0.0	0.7
Implant Breakage Stem				94	0.0	0.7
Implant Breakage Acetabular Insert	1	0.0	1.2	88	0.0	0.6
Lysis				69	0.0	0.5
Implant Breakage Acetabular				50	0.0	0.3
Metal Related Pathology	1	0.0	1.2	45	0.0	0.3
Tumour				36	0.0	0.2
Wear Head				30	0.0	0.2
Heterotopic Bone				24	0.0	0.2
Wear Acetabular Insert				24	0.0	0.2
Implant Breakage Head				15	0.0	0.1
Wear Acetabulum				3	0.0	0.0
Progression Of Disease				2	0.0	0.0
Osteonecrosis				1	0.0	0.0
Synovitis				1	0.0	0.0
Other	1	0.0	1.2	224	0.0	1.6
N Revision	85	2.7	100.0	14428	2.9	100.0
N Primary	3172			490973		

Note: This table is restricted to revisions within 7 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2022 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/G7 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

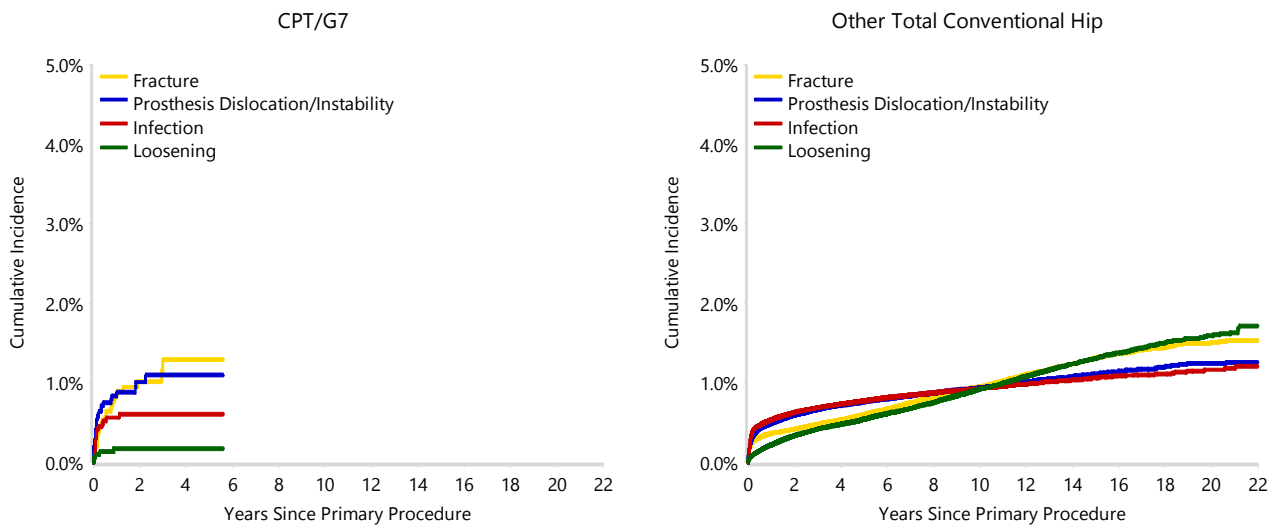


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the CPT/G7 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/G7 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 7 Years)

Type of Revision	CPT/G7		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Femoral Component	30	35.3	4509	31.3
Acetabular Component	13	15.3	2678	18.6
THR (Femoral/Acetabular)	8	9.4	1550	10.7
Cement Spacer			542	3.8
Removal of Prostheses			86	0.6
Reinsertion of Components			27	0.2
Bipolar Head and Femoral			4	0.0
Total Femoral			4	0.0
Saddle			1	0.0
N Major	51	60.0	9401	65.2
Head/Insert	30	35.3	3808	26.4
Head Only	1	1.2	801	5.6
Minor Components	1	1.2	244	1.7
Insert Only	1	1.2	171	1.2
Bipolar Only			2	0.0
Cement Only	1	1.2		
Head/Neck			1	0.0
N Minor	34	40.0	5027	34.8
TOTAL	85	100.0	14428	100.0

Note: This table is restricted to revisions within 7 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2022 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/G7 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/G7 Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cemented	1	10
Hybrid (Femur Cemented)	84	3162
TOTAL	85	3172

TABLE 7**Revision Rates of CPT/G7 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/G7 Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	1	4
Ceramic/XLPE + Antioxidant	23	923
Metal/XLPE	0	6
Metal/XLPE + Antioxidant	61	2238
Unknown	0	1
TOTAL	85	3172

TABLE 8**Revision Rates of CPT/G7 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/G7 Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	1	79
Lateral	14	667
Posterior	68	2394
TOTAL	83	3140

Note: Excludes 32 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/G7 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/G7	NSW	22	825
	VIC	11	398
	QLD	16	545
	WA	18	874
	SA	6	220
	TAS	0	34
	ACT/NT	12	276
Other Total Conventional Hip	NSW	4706	143943
	VIC	4337	127926
	QLD	3435	86382
	WA	2371	58014
	SA	1615	45418
	TAS	405	16348
	ACT/NT	498	12942
TOTAL		17452	494145

Note: Prostheses no longer used in 2022 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/G7 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/G7 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 2022 has a maximum of one year to be revised, whereas a primary procedure performed in 2020 has a maximum of three years to be revised.

Table 10: Number of Revisions of CPT/G7 Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2016	1	30
2017	6	101
2018	8	217
2019	13	384
2020	20	676
2021	28	883
2022	9	881
TOTAL	85	3172

TABLE 11

Revision Rates of CPT/G7 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/G7 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
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
CPT	00811400318-00811400426	ZIMALOY COCR POLISHED TAPER EXTENDED OFFSET LONG FEMORAL STEM	YES	METAL		POLISHED
CPT	00811401218-00811401318	ZIMALOY COCR POLISHED TAPER VALGUS NECK LONG FEMORAL STEM	YES	METAL		POLISHED
Acetabular						
G7	010000658-010000671	POROUS PLASMA 3 HOLE ACETABULAR SHELL	NO	METAL	HA COATED	
G7	010000698-010000711	POROUS PLASMA 3 HOLE ACETABULAR SHELL WITH BONEMASTER	NO	METAL	HA COATED	
G7	110010242-110010250	G7 OSSEO TI ACETABULAR SHELL LIMITED HOLE CEMENTLESS	NO			
G7	110010250-110010277	G7 OSSEO TI ACETABULAR SHELL MULTI HOLE CEMENTLESS	NO	METAL		

Table 11: Revised Number of CPT/G7 Primary Total Conventional Hip Replacement by Catalogue Number Range

Femoral Stem Range	Acetabular Range	N Revised	N Total
00811400000-00811405000	010000658-010000671	5	145
	010000698-010000711	17	896
	110010242-110010250	6	173
	110010250-110010277	2	117
00811400010-00811400510	010000658-010000671	6	162
	010000698-010000711	21	969
	110010242-110010250	6	317
	110010250-110010277	7	100
00811400218-00811400218	010000658-010000671	0	5
	010000698-010000711	0	9
	110010242-110010250	0	7
	110010250-110010277	1	10
00811400230-00811400530	010000658-010000671	2	27
	010000698-010000711	9	136
	110010242-110010250	2	65
	110010250-110010277	1	10
00811400318-00811400426	010000658-010000671	0	2
	010000698-010000711	0	10
	110010242-110010250	0	6
	110010250-110010277	0	5
00811401218-00811401318	110010250-110010277	0	1
TOTAL		85	3172