Delta-One-TT Total Conventional Hip Investigation

Note: This analysis compares the Delta-One-TT acetabular 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 Delta-One-TT 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)
Delta-One-TT	14	199	1088	1.29 (0.70, 2.16)
Other Total Conventional Hip	19236	538377	3453802	0.56 (0.55, 0.56)
TOTAL	**19250**	**538576**	**3454889**	**0.56 (0.55, 0.57)**

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 Delta-One-TT 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
Delta-One-TT	3.5 (1.7, 7.3)	4.7 (2.4, 8.8)	5.9 (3.3, 10.4)	5.9 (3.3, 10.4)	6.7 (3.8, 11.6)	7.7 (4.5, 13.2)	7.7 (4.5, 13.2)	7.7 (4.5, 13.2)
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
Delta-One-TT	9.5 (5.4, 16.5)							
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)	6.0 (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
Delta-One-TT							
Other Total Conventional Hip	7.3 (7.1, 7.4)	7.6 (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.

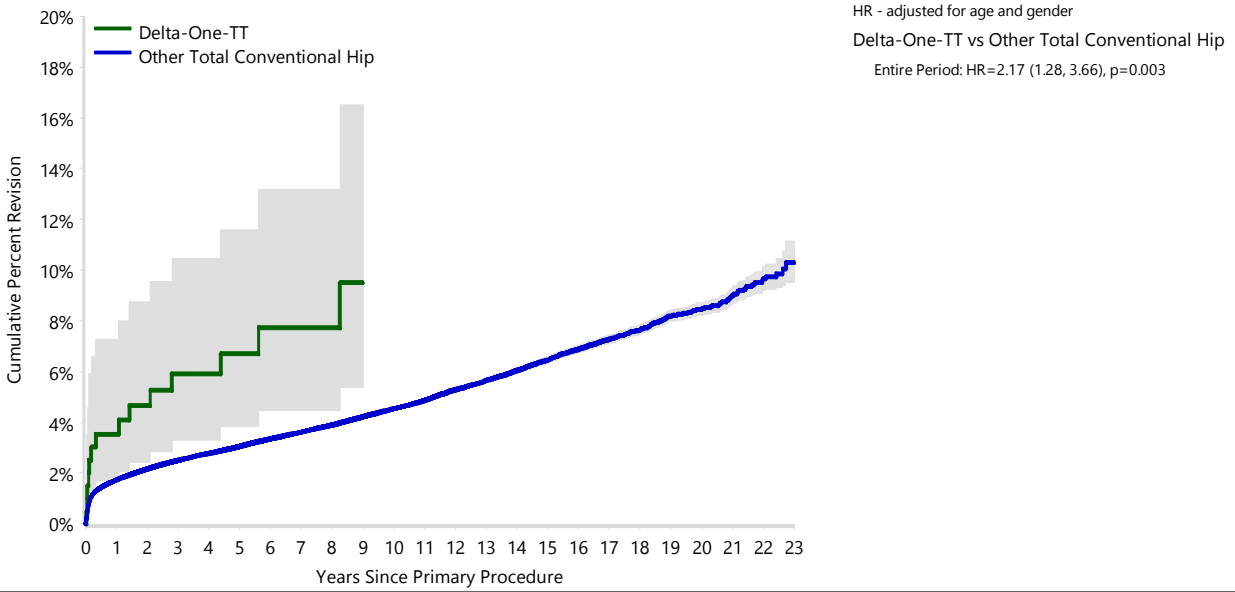
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Delta-One-TT 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
Delta-One-TT	199	176	159	143	127	103	87	71	58	44	16	6
Other Total Conventional Hip	538377	475504	425681	377057	332816	288905	247726	209570	174528	143266	117812	96246

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
Delta-One-TT	3	1	0	0	0	0	0	0	0	0	0	0
Other Total Conventional Hip	77813	61601	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

	Delta-One-TT		Other Total Conventional Hip	
Primary Diagnosis	Number	Percent	Number	Percent
Osteoarthritis	7	50.0	15944	82.9
Fractured Neck Of Femur	1	7.1	1419	7.4
Osteonecrosis	2	14.3	858	4.5
Developmental Dysplasia	2	14.3	318	1.7
Rheumatoid Arthritis	1	7.1	207	1.1
Failed Internal Fixation			151	0.8
Tumour			149	0.8
Other Inflammatory Arthritis			106	0.6
Fracture/Dislocation			53	0.3
Other	1	7.1	16	0.1
Arthrodesis Takedown			15	0.1
TOTAL	**14**	**100.0**	**19236**	**100.0**

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 13.1 Years)

	Delta-One-TT			Other Total Conventional Hip		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	3	1.5	21.4	4420	0.8	24.0
Prosthesis Dislocation/Instability	5	2.5	35.7	4274	0.8	23.2
Fracture	1	0.5	7.1	4040	0.8	22.0
Loosening	4	2.0	28.6	3553	0.7	19.3
Pain				326	0.1	1.8
Leg Length Discrepancy				290	0.1	1.6
Malposition				265	0.0	1.4
Implant Breakage Stem				173	0.0	0.9
Lysis				164	0.0	0.9
Implant Breakage Acetabular Insert				125	0.0	0.7
Incorrect Sizing				103	0.0	0.6
Wear Acetabular Insert	1	0.5	7.1	74	0.0	0.4
Implant Breakage Acetabular				70	0.0	0.4
Metal Related Pathology				69	0.0	0.4
Wear Head				45	0.0	0.2
Tumour				42	0.0	0.2
Implant Breakage Head				29	0.0	0.2
Heterotopic Bone				26	0.0	0.1
Wear Acetabulum				9	0.0	0.0
Osteonecrosis				2	0.0	0.0
Progression Of Disease				2	0.0	0.0
Synovitis				1	0.0	0.0
Other				290	0.1	1.6
N Revision	**14**	**7.0**	**100.0**	**18392**	**3.4**	**100.0**
N Primary	**199**			**538377**		

Note: This table is restricted to revisions within 13.1 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.

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 Delta-One-TT 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

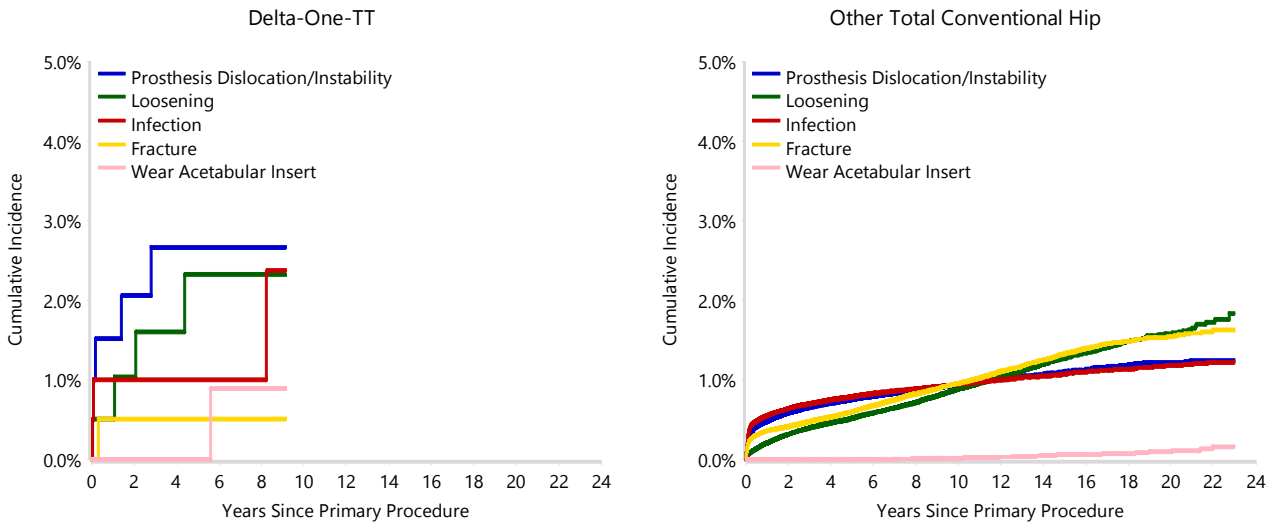


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the Delta-One-TT 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 Delta-One-TT 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 13.1 Years)

	Delta-One-TT		Other Total Conventional Hip	
Type of Revision	Number	Percent	Number	Percent
Femoral Component	2	14.3	6075	33.0
Acetabular Component	5	35.7	3380	18.4
THR (Femoral/Acetabular)	4	28.6	2072	11.3
Cement Spacer			611	3.3
Removal of Prostheses			97	0.5
Reinsertion of Components			28	0.2
Bipolar Head and Femoral			7	0.0
Total Femoral			7	0.0
Saddle			1	0.0
N Major	**11**	**78.6**	**12278**	**66.8**
Head/Insert	3	21.4	4711	25.6
Head Only			914	5.0
Minor Components			301	1.6
Insert Only			184	1.0
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	**3**	**21.4**	**6114**	**33.2**
TOTAL	**14**	**100.0**	**18392**	**100.0**

Note: This table is restricted to revisions within 13.1 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 Delta-One-TT 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 Delta-One-TT Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cementless	12	160
Hybrid (Femur Cemented)	2	38
Reverse Hybrid (Femur Cementless)	0	1
TOTAL	**14**	**199**

TABLE 7

Revision Rates of Delta-One-TT 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 Delta-One-TT Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	3	33
Ceramic/Non XLPE	2	48
Ceramic/XLPE	2	30
Metal/Non XLPE	3	41
Metal/XLPE	2	33
Ceramicised Metal/Non XLPE	1	12
Ceramicised Metal/XLPE	1	2
TOTAL	**14**	**199**

TABLE 8

Revision Rates of Delta-One-TT 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 prosthesis are listed.

Table 8: Revised Number of Delta-One-TT Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	0	20
Lateral	0	18
Posterior	6	85
TOTAL	**6**	**123**

Note: Excludes 76 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 Delta-One-TT 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 9: Revised Number of Primary Total Conventional Hip Replacement by State

Component	State	N Revised	N Total
Delta-One-TT	NSW	1	49
	VIC	7	95
	QLD	5	28
	WA	1	16
	TAS	0	11
Other Total Conventional Hip	NSW	5206	157663
	VIC	4853	140610
	QLD	3786	94558
	WA	2545	63249
	SA	1825	49398
	TAS	452	18189
	ACT/NT	569	14710
TOTAL		**19250**	**538576**

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 10

Number of Revisions of Delta-One-TT Primary Total Conventional Hip Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the Delta-One-TT 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 10: Number of Revisions of Delta-One-TT Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2010	0	4
2011	2	7
2012	0	7
2013	2	15
2014	4	37
2015	0	13
2016	1	12
2017	1	14
2018	0	14
2019	2	23
2020	0	15
2021	1	14
2022	0	13
2023	1	11
TOTAL	**14**	**199**

TABLE 11

Revision Rates of Delta-One-TT 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 Delta-One-TT 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
Acetabular				
Delta-One-TT	554814440-554814740	DELTA-ONE-TT MULTIHOLE ACETABULAR CUP	NO	METAL
Delta-One-TT	554914440-554914660	DELTA-ONE-TT ACETABULAR CUP	NO	METAL

Table 11: Revised Number of Delta-One-TT Primary Total Conventional Hip Replacement by Catalogue Number Range

Acetabular Range	N Revised	N Total
554814440-554814740	2	36
554914440-554914660	12	163
TOTAL	**14**	**199**

TABLE 12

Revision Rates of Delta-One-TT 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 12: Revised Number of Delta-One-TT Primary Total Conventional Hip Replacement by Femoral Stem Component

Femoral Stem Component	N Revised	N Total
Apex	0	2
Arcos	0	1
C-Stem AMT	0	1
C2	0	5
CORAIL	3	13
CPCS	0	2
Custom Made (Biomet)	0	1
Echelon	0	1
Exacta S	0	1
Exeter V40	2	11
Friendly Hip	0	7
Furlong	0	2
Furlong Evolution	0	1
Furlong LOL	0	1
H-Max	3	63
H-Max (exch neck)	0	2
LPS	0	1
Metafix	0	3
Minima S	0	1
Modulus	0	15
Optimys	0	2
Paragon	0	1
Polarstem	0	2
Quadra-C	0	3
Quadra-H	0	7
Reclaim	0	1
Revision Hip	2	19
S-Rom	1	9
SL-Plus	2	10
Summit	0	6
Synergy	0	1
Taper Fit	0	2
Taperloc	0	1
UniSyn	1	1
TOTAL	**14**	**199**