Furlong Evolution Total Conventional Hip Investigation

Note: This analysis compares the Furlong Evolution 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-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 Furlong Evolution 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)
Furlong Evolution	36	516	1587	2.27 (1.59, 3.14)
Other Total Conventional Hip	15828	452985	2719831	0.58 (0.57, 0.59)
TOTAL	**15864**	**453501**	**2721418**	**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 Furlong Evolution 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
Furlong Evolution	5.1 (3.4, 7.4)	6.5 (4.6, 9.2)	7.9 (5.7, 11.0)	7.9 (5.7, 11.0)	8.7 (6.2, 12.1)	8.7 (6.2, 12.1)	8.7 (6.2, 12.1)
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, 3.4)	3.7 (3.6, 3.7)

CPR	8 Yrs	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs
Furlong Evolution							
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
Furlong Evolution							
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.

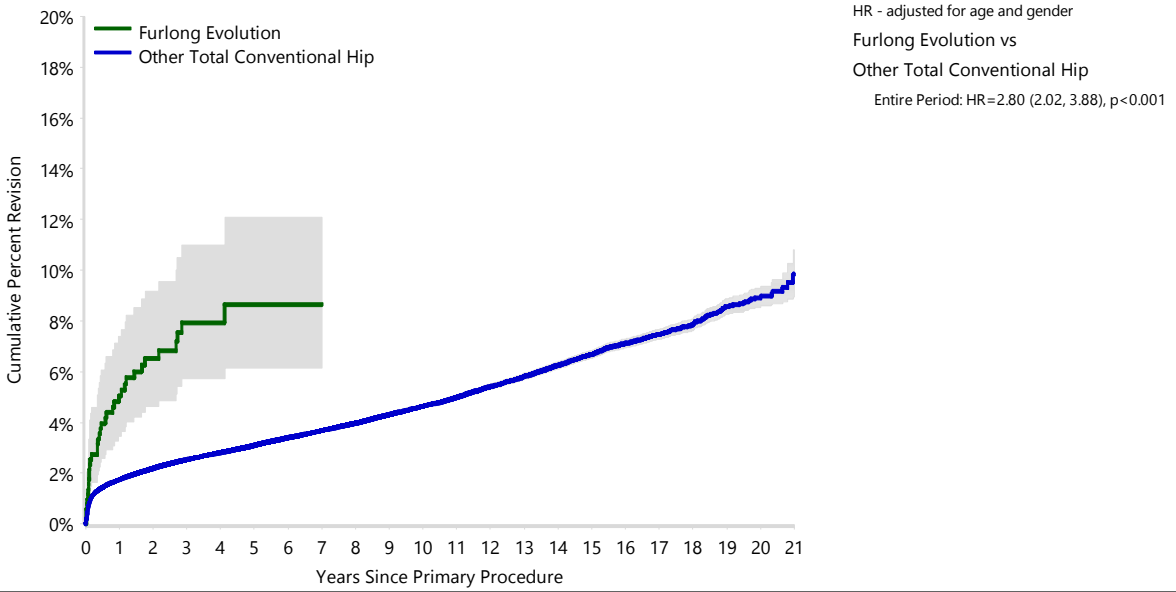
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Furlong Evolution 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
Furlong Evolution	516	415	331	230	139	87	76	46	25	0	0
Other Total Conventional Hip	452985	398311	353764	308988	267107	228010	191542	158557	131191	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
Furlong Evolution	0	0	0	0	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

	Furlong Evolution		Other Total Conventional Hip	
Primary Diagnosis	Number	Percent	Number	Percent
Osteoarthritis	33	91.7	13083	82.7
Fractured Neck Of Femur	1	2.8	1164	7.4
Osteonecrosis	2	5.6	716	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	**36**	**100.0**	**15828**	**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 8.9 Years)

	Furlong Evolution			Other Total Conventional Hip		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Prosthesis Dislocation/Instability	2	0.4	5.6	3485	0.8	24.7
Infection	12	2.3	33.3	3367	0.7	23.9
Fracture	6	1.2	16.7	2993	0.7	21.2
Loosening	10	1.9	27.8	2671	0.6	18.9
Pain				274	0.1	1.9
Leg Length Discrepancy	2	0.4	5.6	255	0.1	1.8
Malposition	3	0.6	8.3	212	0.0	1.5
Implant Breakage Stem				112	0.0	0.8
Incorrect Sizing	1	0.2	2.8	93	0.0	0.7
Implant Breakage Acetabular Insert				89	0.0	0.6
Lysis				88	0.0	0.6
Implant Breakage Acetabular				51	0.0	0.4
Metal Related Pathology				50	0.0	0.4
Tumour				36	0.0	0.3
Wear Acetabular Insert				35	0.0	0.2
Wear Head				35	0.0	0.2
Heterotopic Bone				22	0.0	0.2
Implant Breakage Head				22	0.0	0.2
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				213	0.0	1.5
N Revision	**36**	**7.0**	**100.0**	**14110**	**3.1**	**100.0**
N Primary	**516**			**452985**		

Note: This table is restricted to revisions within 8.9 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 Furlong Evolution 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

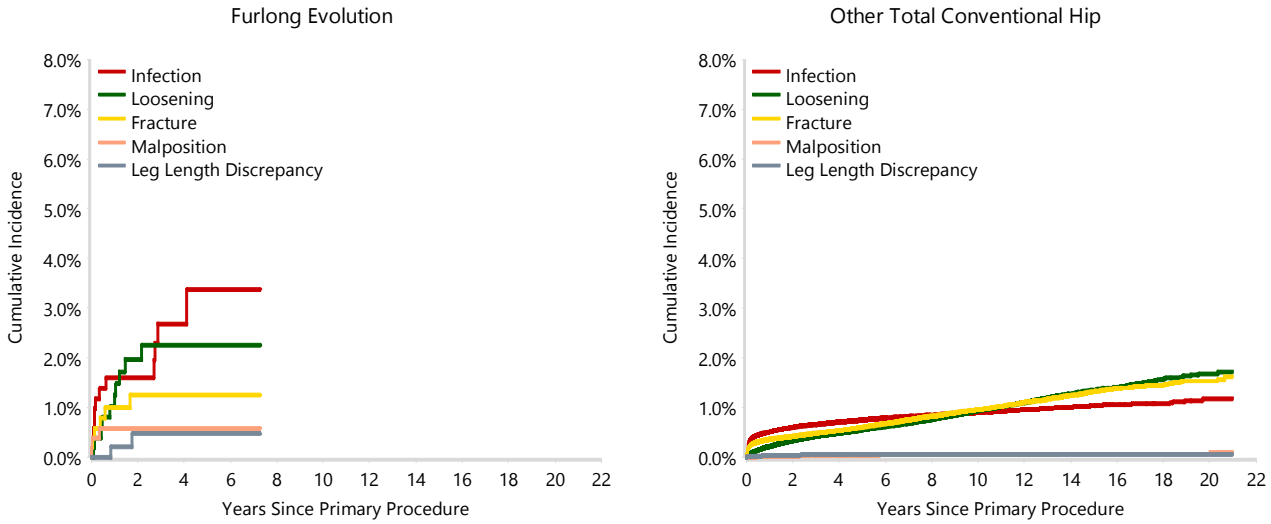


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the Furlong Evolution 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 Furlong Evolution 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 8.9 Years)

	Furlong Evolution		Other Total Conventional Hip	
Type of Revision	Number	Percent	Number	Percent
Femoral Component	15	41.7	4520	32.0
Acetabular Component	5	13.9	2662	18.9
THR (Femoral/Acetabular)	5	13.9	1501	10.6
Cement Spacer	3	8.3	550	3.9
Removal of Prostheses	1	2.8	89	0.6
Reinsertion of Components			25	0.2
Total Femoral			5	0.0
Bipolar Head and Femoral			4	0.0
Saddle			1	0.0
N Major	**29**	**80.6**	**9357**	**66.3**
Head/Insert	4	11.1	3577	25.4
Head Only	2	5.6	760	5.4
Minor Components	1	2.8	244	1.7
Insert Only			168	1.2
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	**7**	**19.4**	**4753**	**33.7**
TOTAL	**36**	**100.0**	**14110**	**100.0**

Note: This table is restricted to revisions within 8.9 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 Furlong Evolution 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 Furlong Evolution Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cementless	36	516
TOTAL	**36**	**516**

TABLE 7

Revision Rates of Furlong Evolution 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 Furlong Evolution Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	20	250
Ceramic/Non XLPE	10	209
Ceramic/XLPE	1	17
Ceramic/XLPE + Antioxidant	0	4
Metal/Non XLPE	4	35
Metal/XLPE	1	1
TOTAL	**36**	**516**

TABLE 8

Revision Rates of Furlong Evolution 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 Furlong Evolution Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	20	268
Lateral	5	26
Posterior	5	161
TOTAL	**30**	**455**

Note: Excludes 61 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 Furlong Evolution 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
Furlong Evolution	NSW	4	35
	VIC	10	199
	QLD	5	69
	WA	17	208
	SA	0	2
	ACT/NT	0	3
Other Total Conventional Hip	NSW	4294	132934
	VIC	3972	116801
	QLD	3146	80097
	WA	2167	53744
	SA	1415	41927
	TAS	372	15098
	ACT/NT	462	12384
TOTAL		**15864**	**453501**

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 Furlong Evolution Primary Total Conventional Hip Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the Furlong Evolution 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 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 Furlong Evolution Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2013	2	29
2014	4	25
2015	2	32
2016	0	11
2017	3	54
2018	10	102
2019	10	106
2020	5	83
2021	0	74
TOTAL	**36**	**516**

TABLE 11

Revision Rates of Furlong Evolution 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 Furlong Evolution 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
Femoral Stem				
Furlong Evolution	4260106-4260117	FURLONG EVOLUTION COLLARED 126° NECK ANGLE STD OFFSET	NO	METAL
Furlong Evolution	4260210-4260212	FURLONG EVOLUTION COLLARLESS 126° NECK ANGLE STD OFFSET TI6AL4V	NO	METAL
Furlong Evolution	4265106-4265117	FURLONG EVOLUTION COLLARED 126° NECK ANGLE HIGH OFFSET TI6AL4V	NO	METAL
Furlong Evolution	4265111-4265211	FURLONG EVOLUTION COLLARLESS 126° NECK ANGLE HIGH OFFSET TI6AL4V	NO	METAL
Furlong Evolution	4330106-4330117	FURLONG EVOLUTION COLLARED 133° NECK ANGLE STD OFFSET TI6AL4V	NO	METAL
Furlong Evolution	4330206-4330214	FURLONG EVOLUTION COLLARLESS 133° NECK ANGLE STD OFFSET TI6AL4V	NO	METAL
Furlong Evolution	4335106-4335117	FURLONG EVOLUTION COLLARED 133° NECK ANGLE HIGH OFFSET TI6AL4V	NO	METAL
Furlong Evolution	4335208-4335217	FURLONG EVOLUTION COLLARLESS 133° NECK ANGLE HIGH OFFSET TI6AL4V	NO	METAL

Table 11: Revised Number of Furlong Evolution Primary Total Conventional Hip Replacement by Catalogue Number Range

Femoral Stem Range	N Revised	N Total
4260106-4260117	7	39
4260210-4260212	0	2
4265106-4265117	4	42
4265111-4265211	1	15
4330106-4330117	14	243
4330206-4330214	4	39
4335106-4335117	3	114
4335208-4335217	3	22
TOTAL	**36**	**516**

TABLE 12

Revision Rates of Furlong Evolution 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 Furlong Evolution Primary Total Conventional Hip Replacement by Acetabular Component

Acetabular Component	N Revised	N Total
Acetabular Shell (Global)	1	6
Adaptive	0	9
Delta-One-TT	0	1
Delta-TT	0	3
Furlong	30	432
Logical G	0	17
Mpact	4	41
PINNACLE	0	2
R3	1	1
Trident/Tritanium (Shell)	0	1
Versafitcup CC	0	3
TOTAL	**36**	**516**