Echelon Total Conventional Hip Investigation

Note: This analysis compares the Echelon 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-2025.

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 2024 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Conventional Hip Replacement

The revision rate of the Echelon 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)
Echelon	37	479	2462	1.50 (1.06, 2.07)
Other Total Conventional Hip	19459	551710	3550209	0.55 (0.54, 0.56)
TOTAL	**19496**	**552189**	**3552671**	**0.55 (0.54, 0.56)**

Note: Prostheses no longer used in 2024 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 Echelon total conventional hip prosthesis is compared to all other total conventional hip prostheses.

Table 2: Yearly Cumulative Percent Revision (95% CI) of Primary Total Conventional Hip Replacement

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs
Echelon	5.2 (3.5, 7.7)	7.4 (5.3, 10.4)	8.0 (5.8, 11.2)	8.4 (6.1, 11.6)	8.4 (6.1, 11.6)	9.9 (7.2, 13.6)	9.9 (7.2, 13.6)	9.9 (7.2, 13.6)
Other Total Conventional Hip	1.7 (1.7, 1.8)	2.2 (2.1, 2.2)	2.5 (2.4, 2.5)	2.8 (2.7, 2.8)	3.0 (3.0, 3.1)	3.3 (3.3, 3.4)	3.6 (3.5, 3.6)	3.8 (3.8, 3.9)

CPR	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs
Echelon	9.9 (7.2, 13.6)	9.9 (7.2, 13.6)	9.9 (7.2, 13.6)	9.9 (7.2, 13.6)	9.9 (7.2, 13.6)			
Other Total Conventional Hip	4.2 (4.1, 4.2)	4.4 (4.4, 4.5)	4.8 (4.7, 4.8)	5.2 (5.1, 5.3)	5.5 (5.4, 5.6)	5.9 (5.8, 6.0)	6.3 (6.2, 6.4)	6.7 (6.6, 6.9)

CPR	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs	23 Yrs
Echelon							
Other Total Conventional Hip	7.1 (6.9, 7.2)	7.4 (7.3, 7.6)	7.9 (7.7, 8.1)	8.3 (8.0, 8.5)	8.8 (8.5, 9.1)	9.3 (9.0, 9.7)	9.9 (9.4, 10.5)

Note: Prostheses no longer used in 2024 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

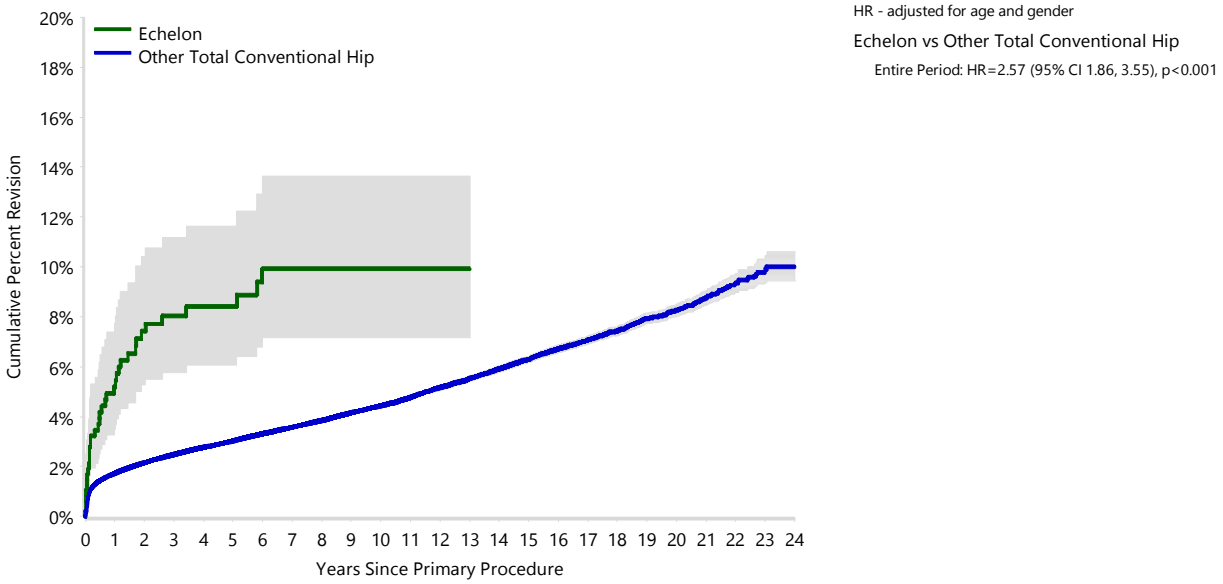
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Echelon 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
Echelon	479	361	310	260	229	197	172	140	110	88	71	58
Other Total Conventional Hip	551710	487381	432533	383972	337004	295632	254789	216995	182134	150298	122086	99326

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
Echelon	48	40	33	31	26	19	19	14	11	7	3	0
Other Total Conventional Hip	80181	63964	49862	37910	28043	20565	15086	10859	7417	4530	2344	851

Note: Prostheses no longer used in 2024 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

	Echelon		Other Total Conventional Hip	
Primary Diagnosis	Number	Percent	Number	Percent
Osteoarthritis	7	18.9	16168	83.1
Fractured Neck Of Femur	8	21.6	1428	7.3
Osteonecrosis	1	2.7	855	4.4
Developmental Dysplasia			313	1.6
Rheumatoid Arthritis			210	1.1
Failed Internal Fixation	10	27.0	148	0.8
Tumour	7	18.9	142	0.7
Other Inflammatory Arthritis			112	0.6
Fracture/Dislocation	3	8.1	50	0.3
Other			19	0.1
Arthrodesis Takedown	1	2.7	14	0.1
TOTAL	**37**	**100.0**	**19459**	**100.0**

Note: Prostheses no longer used in 2024 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 22.6 Years)

	Echelon			Other Total Conventional Hip		
Revision Diagnosis	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	6	1.3	16.2	4765	0.9	24.5
Prosthesis Dislocation/Instability	12	2.5	32.4	4391	0.8	22.6
Fracture	3	0.6	8.1	4343	0.8	22.3
Loosening	10	2.1	27.0	3698	0.7	19.0
Pain				327	0.1	1.7
Leg Length Discrepancy				297	0.1	1.5
Malposition				269	0.0	1.4
Lysis				209	0.0	1.1
Implant Breakage Stem	3	0.6	8.1	197	0.0	1.0
Implant Breakage Acetabular Insert				127	0.0	0.7
Wear Acetabular Insert				108	0.0	0.6
Incorrect Sizing				98	0.0	0.5
Metal Related Pathology	2	0.4	5.4	92	0.0	0.5
Implant Breakage Acetabular				68	0.0	0.3
Wear Head				43	0.0	0.2
Tumour				40	0.0	0.2
Implant Breakage Head				31	0.0	0.2
Heterotopic Bone				27	0.0	0.1
Wear Acetabulum	1	0.2	2.7	9	0.0	0.0
Osteonecrosis				3	0.0	0.0
Synovitis				1	0.0	0.0
Other				312	0.1	1.6
N Revision	**37**	**7.7**	**100.0**	**19455**	**3.5**	**100.0**
N Primary	**479**			**551710**		

Note: This table is restricted to revisions within 22.6 years for all groups to allow a time-matched comparison of revisions.
Note: Prostheses no longer used in 2024 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 Echelon 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

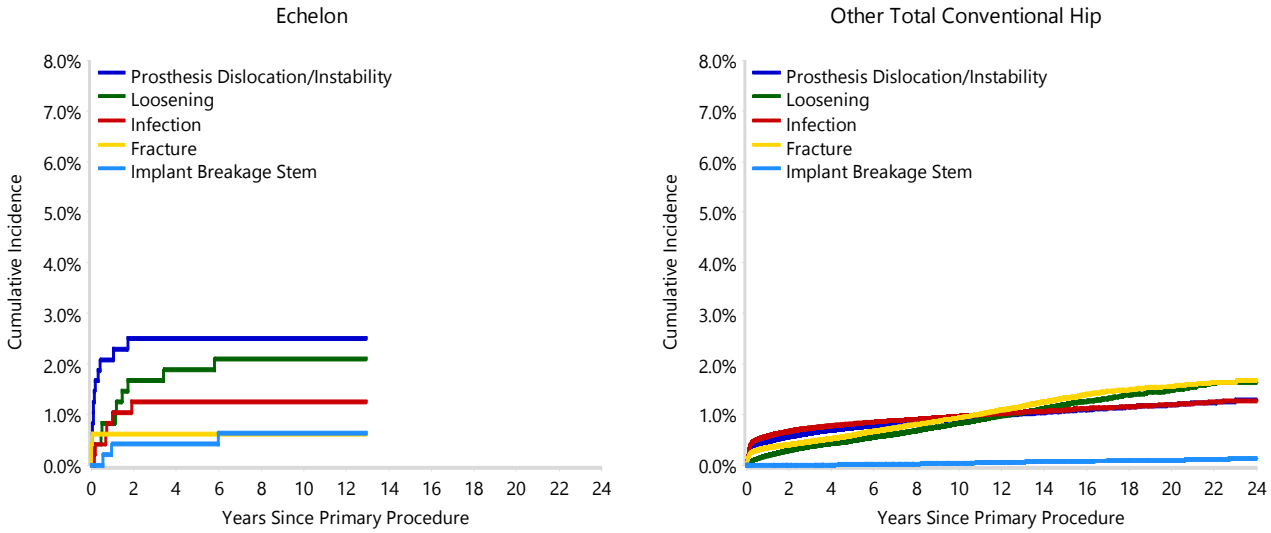


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the Echelon 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 Echelon 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 22.6 Years)

	Echelon		Other Total Conventional Hip	
Type of Revision	Number	Percent	Number	Percent
Femoral Component	12	32.4	6548	33.7
Acetabular Component	12	32.4	3408	17.5
THR (Femoral/Acetabular)	1	2.7	2256	11.6
Cement Spacer	2	5.4	591	3.0
Removal of Prostheses	2	5.4	96	0.5
Reinsertion of Components			29	0.1
Total Femoral			13	0.1
Bipolar Head and Femoral			9	0.0
N Major	**29**	**78.4**	**12950**	**66.6**
Head/Insert	6	16.2	5096	26.2
Head Only	1	2.7	923	4.7
Minor Components	1	2.7	304	1.6
Insert Only			179	0.9
Bipolar Only			1	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	**8**	**21.6**	**6505**	**33.4**
TOTAL	**37**	**100.0**	**19455**	**100.0**

Note: This table is restricted to revisions within 22.6 years for all groups to allow a time-matched comparison of revisions.
Note: Prostheses no longer used in 2024 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 Echelon 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 Echelon Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cemented	10	166
Cementless	17	180
Hybrid (Femur Cemented)	10	117
Reverse Hybrid (Femur Cementless)	0	16
TOTAL	**37**	**479**

TABLE 7

Revision Rates of Echelon 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 Echelon Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Ceramic/Ceramic	1	15
Ceramic/Non XLPE	0	2
Ceramic/XLPE	0	3
Metal/Metal	3	21
Metal/Non XLPE	3	61
Metal/XLPE	16	260
Metal/XLPE + Antioxidant	1	3
Ceramicised Metal/Non XLPE	0	15
Ceramicised Metal/XLPE	13	95
Ceramicised Metal/XLPE + Antioxidant	0	2
Unknown	0	2
TOTAL	**37**	**479**

TABLE 8

Revision Rates of Echelon 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 Echelon Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	0	5
Lateral	3	36
Posterior	12	133
TOTAL	**15**	**174**

Note: Excludes 305 procedures with no approach recorded

TABLE 9

Number of Revisions of Echelon Primary Total Conventional Hip Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the Echelon 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 2024 has a maximum of one year to be revised, whereas a primary procedure performed in 2022 has a maximum of three years to be revised.

Table 9: Number of Revisions of Echelon Primary Total Conventional Hip Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2001	0	2
2002	1	10
2003	0	13
2004	0	16
2005	1	13
2006	1	25
2007	1	18
2008	1	27
2009	2	19
2010	4	30
2011	2	21
2012	3	40
2013	3	31
2014	2	30
2015	4	32
2016	3	47
2017	3	43
2018	5	41
2019	0	10
2020	0	3
2021	0	3
2022	0	2
2023	0	1
2024	1	2
TOTAL	**37**	**479**

TABLE 10

Revision Rates of Echelon 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 10: Revised Number of Echelon Primary Total Conventional Hip Replacement by Acetabular Component

Acetabular Component	N Revised	N Total
ASR	0	1
Avantage	0	1
BHR	1	14
Brunswick	0	4
Contemporary	0	2
Continuum	0	3
Delta-One-TT	0	1
Delta-TT	0	1
Equator+ Cup	0	3
Exeter X3 Rimfit	1	1
G7	0	1
Low Profile Cup	0	1
Mallory-Head	0	2
Muller	1	6
No Acetabular	0	1
Novae E	0	2
PINNACLE	0	3
Polarcup	7	47
R3	16	169
Reflection (Cup)	5	126
Reflection (Shell)	3	68
Trabecular Metal (Shell)	0	5
Tri-Flange	1	1
Trident (Cup)	0	1
Trident (Shell)	1	8
Trident/Tritanium (Shell)	0	1
Trilogy	1	2
Trinity	0	1
ZCA	0	3
TOTAL	**37**	**479**