

Avenir/Fitmore Total Conventional Hip Investigation

Note: This analysis compares the Avenir/Fitmore 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 Avenir/Fitmore 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)
Avenir/Fitmore	17	298	845	2.01 (1.17, 3.22)
Other Total Conventional Hip	15842	453157	2720293	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 Avenir/Fitmore 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
Avenir/Fitmore	5.2 (3.2, 8.5)	5.6 (3.5, 9.1)	5.6 (3.5, 9.1)	6.4 (4.0, 10.3)	6.4 (4.0, 10.3)		
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
Avenir/Fitmore							
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
Avenir/Fitmore							
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.

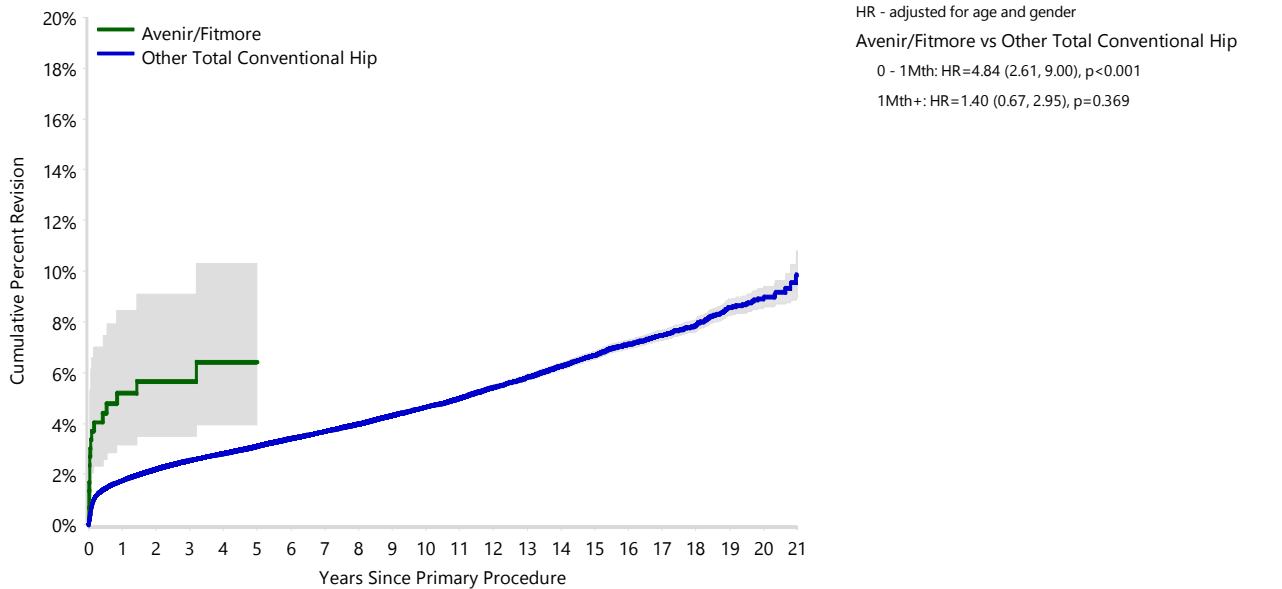
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the Avenir/Fitmore 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
Avenir/Fitmore	298	229	188	134	93	49	10	6	2	0	0
Other Total Conventional Hip	453157	398454	353865	309043	267112	228011	191577	158577	131208	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
Avenir/Fitmore	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

Primary Diagnosis	Avenir/Fitmore		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Osteoarthritis	17	100.0	13095	82.7
Fractured Neck Of Femur			1164	7.3
Osteonecrosis			718	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	17	100.0	15842	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 8.3 Years)

Revision Diagnosis	Avenir/Fitmore			Other Total Conventional Hip		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Prosthesis Dislocation/Instability	1	0.3	5.9	3448	0.8	24.9
Infection	7	2.3	41.2	3344	0.7	24.1
Fracture	3	1.0	17.6	2921	0.6	21.1
Loosening	3	1.0	17.6	2605	0.6	18.8
Pain	1	0.3	5.9	264	0.1	1.9
Leg Length Discrepancy				257	0.1	1.9
Malposition				212	0.0	1.5
Implant Breakage Stem				102	0.0	0.7
Incorrect Sizing				93	0.0	0.7
Implant Breakage Acetabular Insert				87	0.0	0.6
Lysis				79	0.0	0.6
Implant Breakage Acetabular				51	0.0	0.4
Metal Related Pathology				49	0.0	0.4
Tumour				36	0.0	0.3
Wear Head				34	0.0	0.2
Wear Acetabular Insert				30	0.0	0.2
Heterotopic Bone				22	0.0	0.2
Implant Breakage Head				19	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	2	0.7	11.8	209	0.0	1.5
N Revision	17	5.7	100.0	13869	3.1	100.0
N Primary	298			453157		

Note: This table is restricted to revisions within 8.3 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 Avenir/Fitmore 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

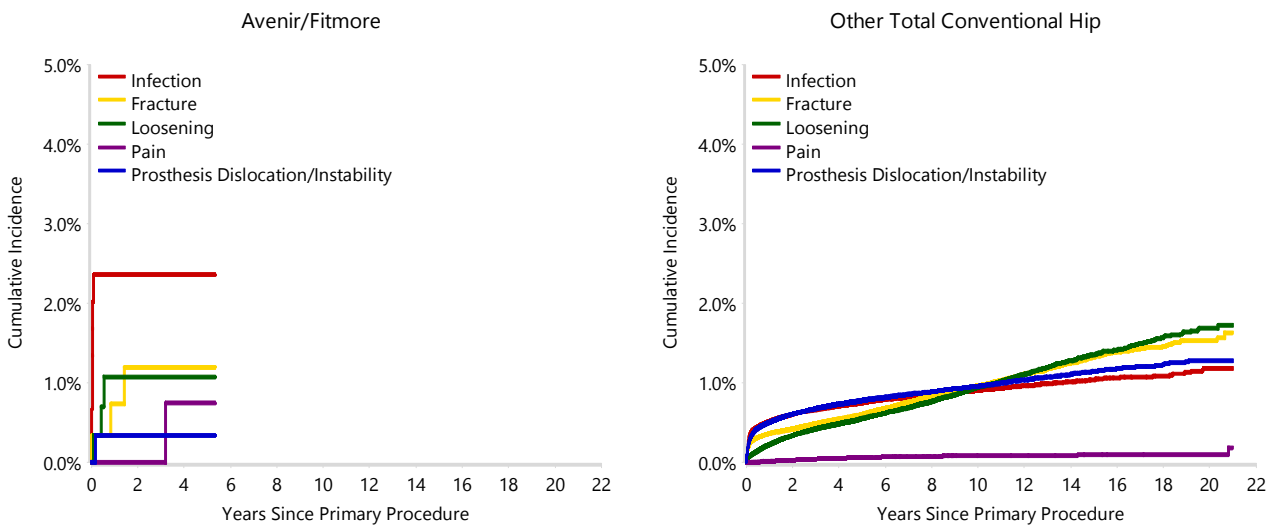


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the Avenir/Fitmore 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 Avenir/Fitmore 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 8.3 Years)

Type of Revision	Avenir/Fitmore		Other Total Conventional Hip	
	Number	Percent	Number	Percent
Femoral Component	3	17.6	4422	31.9
Acetabular Component	3	17.6	2622	18.9
THR (Femoral/Acetabular)			1474	10.6
Cement Spacer			541	3.9
Removal of Prostheses			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	6	35.3	9183	66.2
Head/Insert	11	64.7	3523	25.4
Head Only			754	5.4
Minor Components			239	1.7
Insert Only			166	1.2
Bipolar Only			2	0.0
Cement Only			1	0.0
Head/Neck			1	0.0
N Minor	11	64.7	4686	33.8
TOTAL	17	100.0	13869	100.0

Note: This table is restricted to revisions within 8.3 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 Avenir/Fitmore 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 Avenir/Fitmore Primary Total Conventional Hip Replacement by Fixation

Fixation	N Revised	N Total
Cementless	17	298
TOTAL	17	298

TABLE 7**Revision Rates of Avenir/Fitmore 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 Avenir/Fitmore Primary Total Conventional Hip Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Metal/XLPE	17	298
TOTAL	17	298

TABLE 8**Revision Rates of Avenir/Fitmore 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 Avenir/Fitmore Primary Total Conventional Hip Replacement by Approach

Approach	N Revised	N Total
Anterior	0	27
Lateral	4	86
Posterior	10	173
TOTAL	14	286

Note: Excludes 12 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 Avenir/Fitmore 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
Avenir/Fitmore	NSW	17	298
Other Total Conventional Hip	NSW	4281	132671
	VIC	3982	116998
	QLD	3146	80122
	WA	2184	53952
	SA	1415	41929
	TAS	372	15098
	ACT/NT	462	12387
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 Avenir/Fitmore Primary Total Conventional Hip Replacement by Year of Implant**

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

Year of Implant	Number Revised	Total Number
2013	0	2
2014	3	7
2015	1	5
2016	0	46
2017	1	44
2018	4	42
2019	3	56
2020	3	42
2021	2	54
TOTAL	17	298

TABLE 11

Revision Rates of Avenir/Fitmore 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 Avenir/Fitmore 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
Femoral Stem					
Avenir	0106010001-0106010009	TITANIUM GRIT BLAST HA MULLER STANDARD STEM	NO	METAL	HA COATED
Avenir	0106010101-0106010109	TITANIUM GRIT BLAST HA MULLER LATERAL STEM	NO	METAL	HA COATED
Acetabular					
Fitmore	0100024542-0100024568	TITANIUM SHELL W/SCREW CONES	NO	METAL	

Table 11: Revised Number of Avenir/Fitmore Primary Total Conventional Hip Replacement by Catalogue Number Range

Femoral Stem Range	Acetabular Range	N Revised	N Total
0106010001-0106010009	0100024542-0100024568	14	240
0106010101-0106010109	0100024542-0100024568	3	58
TOTAL		17	298