

E.Motion/E.Motion Total Knee Investigation

Note: This analysis compares the E.Motion/E.Motion femoral/tibial combination with all other total knee 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-2024>.

Note: Procedures using prostheses with no recorded use in 2023 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Knee Replacement

The revision rate of the E.Motion/E.Motion total knee combination is compared to all other total knee prostheses.

Table 1: Revision Rates of Primary Total Knee Replacement

Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
E.Motion/E.Motion	74	1027	8182	0.90 (0.71, 1.14)
Other Total Knee	24857	735056	4679880	0.53 (0.52, 0.54)
TOTAL	24931	736083	4688062	0.53 (0.53, 0.54)

Note: Prostheses no longer used in 2023 are excluded from the comparator.

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the E.Motion/E.Motion total knee combination is compared to all other total knee prostheses.

Table 2: Yearly Cumulative Percent Revision of Primary Total Knee Replacement

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs
E.Motion/E.Motion	2.6 (1.7, 3.7)	4.4 (3.3, 5.8)	5.7 (4.4, 7.3)	6.2 (4.9, 7.9)	6.6 (5.2, 8.3)	6.7 (5.3, 8.4)	7.1 (5.7, 8.9)	7.3 (5.8, 9.1)
Other Total Knee	1.0 (0.9, 1.0)	1.8 (1.8, 1.8)	2.4 (2.3, 2.4)	2.8 (2.7, 2.8)	3.1 (3.1, 3.1)	3.4 (3.4, 3.5)	3.7 (3.7, 3.8)	4.0 (4.0, 4.1)

CPR	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs
E.Motion/E.Motion	7.3 (5.8, 9.1)	8.2 (6.5, 10.2)	8.2 (6.5, 10.2)	8.2 (6.5, 10.2)	8.2 (6.5, 10.2)			
Other Total Knee	4.3 (4.3, 4.4)	4.6 (4.6, 4.7)	4.9 (4.8, 5.0)	5.2 (5.1, 5.3)	5.5 (5.5, 5.6)	5.8 (5.7, 5.9)	6.2 (6.1, 6.3)	6.6 (6.5, 6.7)

CPR	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs	23 Yrs
E.Motion/E.Motion							
Other Total Knee	7.0 (6.8, 7.1)	7.3 (7.1, 7.4)	7.5 (7.3, 7.7)	7.7 (7.5, 7.9)	8.0 (7.7, 8.3)	8.2 (7.9, 8.6)	8.2 (7.9, 8.6)

Note: Prostheses no longer used in 2023 are excluded from the comparator.

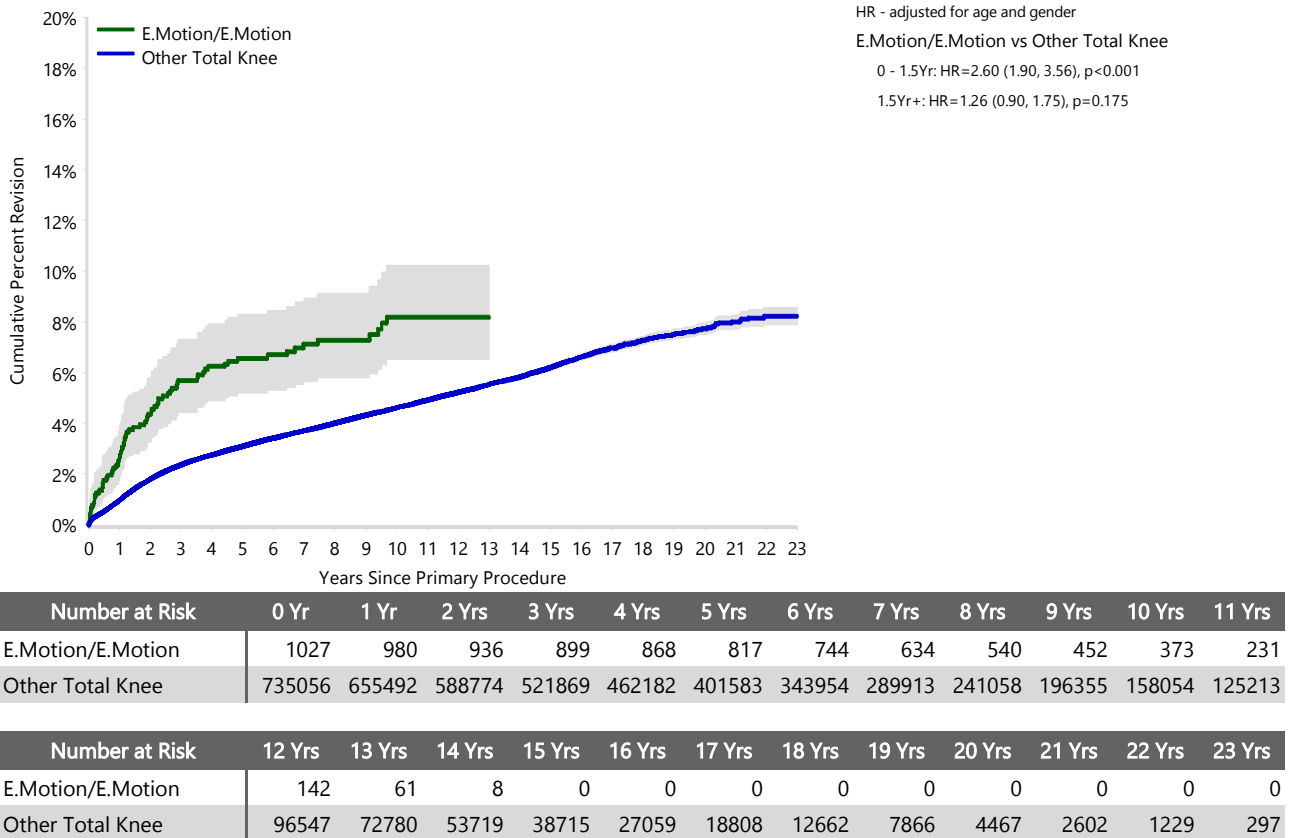
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the E.Motion/E.Motion total knee combination is compared to all other total knee 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 Knee Replacement



Note: Prostheses no longer used in 2023 are excluded from the comparator.

TABLE 3

Primary Diagnosis for Revised Primary Total Knee 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 knee prostheses.

Table 3: Primary Diagnosis for Revised Primary Total Knee Replacement

Primary Diagnosis	E.Motion/E.Motion		Other Total Knee	
	Number	Percent	Number	Percent
Osteoarthritis	74	100.0	24052	96.8
Rheumatoid Arthritis			313	1.3
Tumour			178	0.7
Other Inflammatory Arthritis			153	0.6
Osteonecrosis			89	0.4
Fracture			48	0.2
Other			23	0.1
Chondrocalcinosis			1	0.0
TOTAL	74	100.0	24857	100.0

Note: Prostheses no longer used in 2023 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 Knee Replacement - Reason for Revision (Follow-up Limited to 14.7 Years)

Revision Diagnosis	E.Motion/E.Motion			Other Total Knee		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	17	1.7	23.0	6934	0.9	28.3
Loosening	12	1.2	16.2	5181	0.7	21.2
Instability	6	0.6	8.1	2516	0.3	10.3
Pain	5	0.5	6.8	1807	0.2	7.4
Patella Erosion	8	0.8	10.8	1737	0.2	7.1
Patellofemoral Pain	2	0.2	2.7	1614	0.2	6.6
Arthrofibrosis	9	0.9	12.2	1010	0.1	4.1
Fracture	2	0.2	2.7	957	0.1	3.9
Malalignment	1	0.1	1.4	524	0.1	2.1
Wear Tibial Insert				319	0.0	1.3
Lysis	2	0.2	2.7	267	0.0	1.1
Incorrect Sizing	2	0.2	2.7	226	0.0	0.9
Patella Maltracking	1	0.1	1.4	178	0.0	0.7
Implant Breakage Tibial Insert				170	0.0	0.7
Bearing Dislocation	1	0.1	1.4	139	0.0	0.6
Implant Breakage Patella				129	0.0	0.5
Metal Related Pathology	1	0.1	1.4	97	0.0	0.4
Prosthesis Dislocation	1	0.1	1.4	79	0.0	0.3
Synovitis	1	0.1	1.4	63	0.0	0.3
Osteonecrosis				50	0.0	0.2
Implant Breakage Femoral				41	0.0	0.2
Wear Patella				38	0.0	0.2
Implant Breakage Tibial				34	0.0	0.1
Tumour	1	0.1	1.4	29	0.0	0.1
Heterotopic Bone				13	0.0	0.1
Progression Of Disease				7	0.0	0.0
Wear Tibial				5	0.0	0.0
Patella Dislocation				2	0.0	0.0
Incorrect Side	1	0.1	1.4			
Wear Femoral				1	0.0	0.0
Other	1	0.1	1.4	300	0.0	1.2
N Revision	74	7.2	100.0	24467	3.3	100.0
N Primary	1027			735056		

Note: This table is restricted to revisions within 14.7 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2023 are excluded from the comparator.

FIGURE 2

Cumulative Incidence Revision Diagnosis of Primary Total Knee 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 E.Motion/E.Motion total knee combination. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total knee prostheses.

Figure 2: Cumulative Incidence Revision Diagnosis for Primary Total Knee Replacement

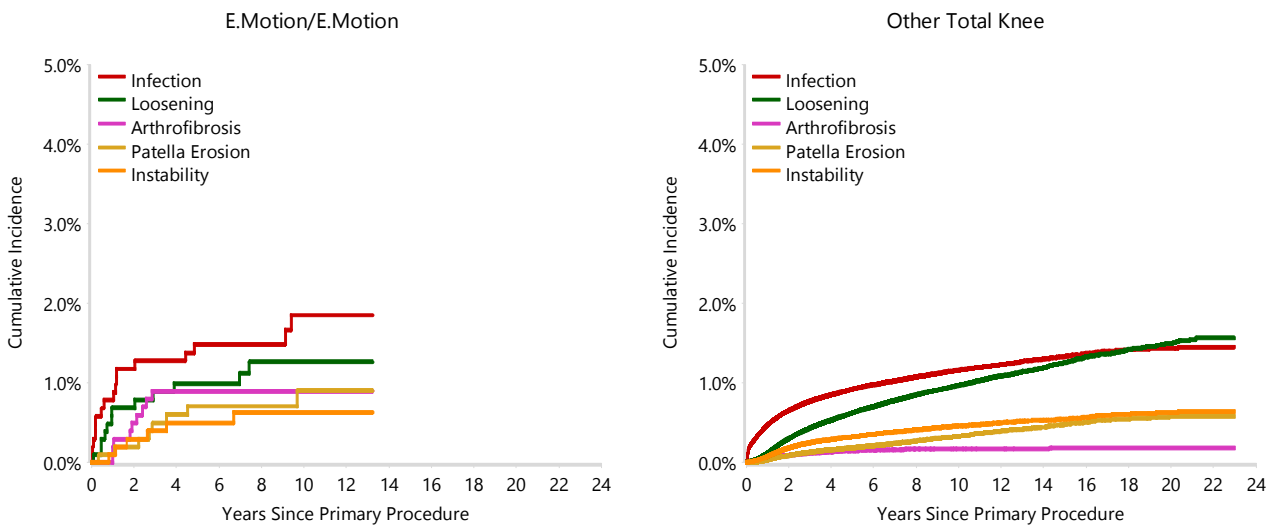


TABLE 5

Type of Revision Performed for Primary Total Knee Replacement

This analysis identifies the components used in the revision of the E.Motion/E.Motion total knee combination and compares it to the components used in the revision of all other total knee 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 knee prostheses i.e. is there a difference in the type of revision undertaken for the E.Motion/E.Motion total knee combination compared to all other total knee prostheses.

Table 5: Primary Total Knee Replacement - Type of Revision (Follow-up Limited to 14.7 Years)

Type of Revision	E.Motion/E.Motion		Other Total Knee	
	Number	Percent	Number	Percent
TKR (Tibial/Femoral)	20	27.0	5787	23.7
Tibial Component	4	5.4	1843	7.5
Femoral Component	9	12.2	1247	5.1
Cement Spacer	4	5.4	1157	4.7
Removal of Prostheses			128	0.5
Total Femoral			22	0.1
Reinsertion of Components			7	0.0
N Major	37	50.0	10191	41.7
Insert Only	18	24.3	7384	30.2
Patella Only	15	20.3	4269	17.4
Insert/Patella	4	5.4	2558	10.5
Minor Components			57	0.2
Cement Only			8	0.0
N Minor	37	50.0	14276	58.3
TOTAL	74	100.0	24467	100.0

Note: This table is restricted to revisions within 14.7 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2023 are excluded from the comparator.

TABLE 6**Revision Rates of E.Motion/E.Motion Primary Total Knee 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 E.Motion/E.Motion Primary Total Knee Replacement by Fixation

Fixation	N Revised	N Total
Cemented	31	612
Cementless	38	385
Hybrid (Tibial Cemented)	3	27
Hybrid (Tibial Cementless)	2	3
TOTAL	74	1027

TABLE 7**Revision Rates of E.Motion/E.Motion Primary Total Knee 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 E.Motion/E.Motion Primary Total Knee Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Non XLPE	74	1027
TOTAL	74	1027

TABLE 8**Revision Rates of E.Motion/E.Motion Primary Total Knee Replacement by Bearing Mobility**

This analysis is provided as some prostheses are combined with a variety of bearing mobilities. All bearing mobilities used with this combination are listed.

Table 8: Revised Number of E.Motion/E.Motion Primary Total Knee Replacement by Bearing Mobility

Bearing Mobility	N Revised	N Total
Rotating	74	1027
TOTAL	74	1027

TABLE 9**Revision Rates of E.Motion/E.Motion Primary Total Knee Replacement by Stability**

This analysis is provided as some prostheses are combined with a variety of stabilities. All stabilities used with this combination are listed.

Table 9: Revised Number of E.Motion/E.Motion Primary Total Knee Replacement by Stability

Stability	N Revised	N Total
Minimally Stabilised	48	592
Posterior Stabilised	26	435
TOTAL	74	1027

TABLE 10

Revision Rates of Primary Total Knee Replacement by State

This enables a state by state variation to be identified for the E.Motion/E.Motion total knee combination and provides the comparative data for each of the states for all other total knee 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 10: Revised Number of Primary Total Knee Replacement by State

Component	State	N Revised	N Total
E.Motion/E.Motion	NSW	72	1006
	VIC	0	2
	TAS	0	1
	ACT/NT	2	18
Other Total Knee	NSW	7254	250253
	VIC	5374	148664
	QLD	5361	153657
	WA	3064	80125
	SA	2756	64011
	TAS	458	18785
	ACT/NT	590	19561
TOTAL		24931	736083

Note: Prostheses no longer used in 2023 are excluded from the comparator.

TABLE 11**Number of Revisions of E.Motion/E.Motion Primary Total Knee Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the E.Motion/E.Motion total knee 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 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 11: Number of Revisions of E.Motion/E.Motion Primary Total Knee Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2009	1	12
2010	10	87
2011	9	114
2012	7	129
2013	16	171
2014	6	71
2015	8	93
2016	9	87
2017	5	101
2018	1	64
2019	0	45
2020	0	12
2021	1	15
2022	0	14
2023	1	12
TOTAL	74	1027

TABLE 12

Revision Rates of E.Motion/E.Motion Primary Total Knee 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 E.Motion/E.Motion 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	Coating
Femoral				
E.Motion	NB702K-NB758K	PS COCR CEMENTED STANDARD FEMORAL COMPONENT	YES	
E.Motion	NB702Z-NB758Z	AS PS COCR CEMENTED PREMIUM FEMORAL COMPONENT	YES	
E.Motion	NO502K-NO608K	FP/UC CEMENTED STANDARD FEMORAL COMPONENT	YES	
E.Motion	NO502Z-NO608Z	AS FP/UC CEMENTED PREMIUM FEMORAL COMPONENT	YES	
E.Motion	NO582K-NO688K	FP/UC CEMENTLESS FEMORAL COMPONENT	NO	HA COATED
Tibial				
E.Motion	NB731K-NB788K	UC/PS CEMENTED MODULAR TIBIA PLATEAU	YES	
E.Motion	NB731Z-NB788Z	AS UC/PS CEMENTED MODULAR TIBIA PLATEAU	YES	
E.Motion	NB741K-NB798K	UC/PS CEMENTLESS MODULAR TIBIA PLATEAU	NO	HA COATED
E.Motion	NO521K-NO628K	FP CEMENTED TIBIAL PLATEAU	YES	

Table 12: Revised Number of E.Motion/E.Motion Primary Total Knee Replacement by Catalogue Number Range

Femoral Range	Tibial Range	N Revised	N Total
NB702K-NB758K	NB731K-NB788K	6	46
	NB731Z-NB788Z	0	7
	NB741K-NB798K	2	2
NB702Z-NB758Z	NB731K-NB788K	1	2
	NB731Z-NB788Z	17	377
	NB741K-NB798K	0	1
NO502K-NO608K	NB731K-NB788K	3	77
	NB731Z-NB788Z	0	3
NO502Z-NO608Z	NB731K-NB788K	1	1
	NB731Z-NB788Z	3	95
NO582K-NO688K	NB731K-NB788K	2	21
	NB731Z-NB788Z	0	4
	NB741K-NB798K	39	390
	NO521K-NO628K	0	1
TOTAL		74	1027