

Advance/Advance Total Knee Investigation

Note: This analysis compares the Advance/Advance 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-2023>.

Note: Procedures using prostheses with no recorded use in 2022 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Knee Replacement

The revision rate of the Advance/Advance 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)
Advance/Advance	75	1009	7970	0.94 (0.74, 1.18)
Other Total Knee	26812	757619	5067010	0.53 (0.52, 0.54)
TOTAL	26887	758628	5074980	0.53 (0.52, 0.54)

Note: Prostheses no longer used in 2022 are excluded from the comparator.

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the Advance/Advance 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
Advance/Advance	2.0 (1.3, 3.1)	4.0 (3.0, 5.5)	5.4 (4.1, 7.0)	6.3 (4.9, 8.0)	6.4 (5.0, 8.1)	7.1 (5.6, 8.9)	7.9 (6.3, 9.8)	7.9 (6.3, 9.8)
Other Total Knee	1.0 (1.0, 1.0)	1.8 (1.8, 1.9)	2.4 (2.4, 2.4)	2.8 (2.8, 2.9)	3.1 (3.1, 3.2)	3.5 (3.4, 3.5)	3.8 (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
Advance/Advance	8.1 (6.5, 10.1)	8.3 (6.7, 10.5)	8.7 (6.9, 10.8)	8.7 (6.9, 10.8)	8.7 (6.9, 10.8)	8.7 (6.9, 10.8)	8.7 (6.9, 10.8)
Other Total Knee	4.3 (4.3, 4.4)	4.6 (4.6, 4.7)	4.9 (4.9, 5.0)	5.2 (5.2, 5.3)	5.6 (5.5, 5.6)	5.9 (5.8, 5.9)	6.2 (6.1, 6.3)

CPR	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs
Advance/Advance							
Other Total Knee	6.6 (6.5, 6.8)	7.0 (6.9, 7.2)	7.3 (7.2, 7.5)	7.6 (7.4, 7.8)	7.8 (7.6, 8.0)	8.0 (7.8, 8.2)	8.2 (7.9, 8.6)

Note: Prostheses no longer used in 2022 are excluded from the comparator.

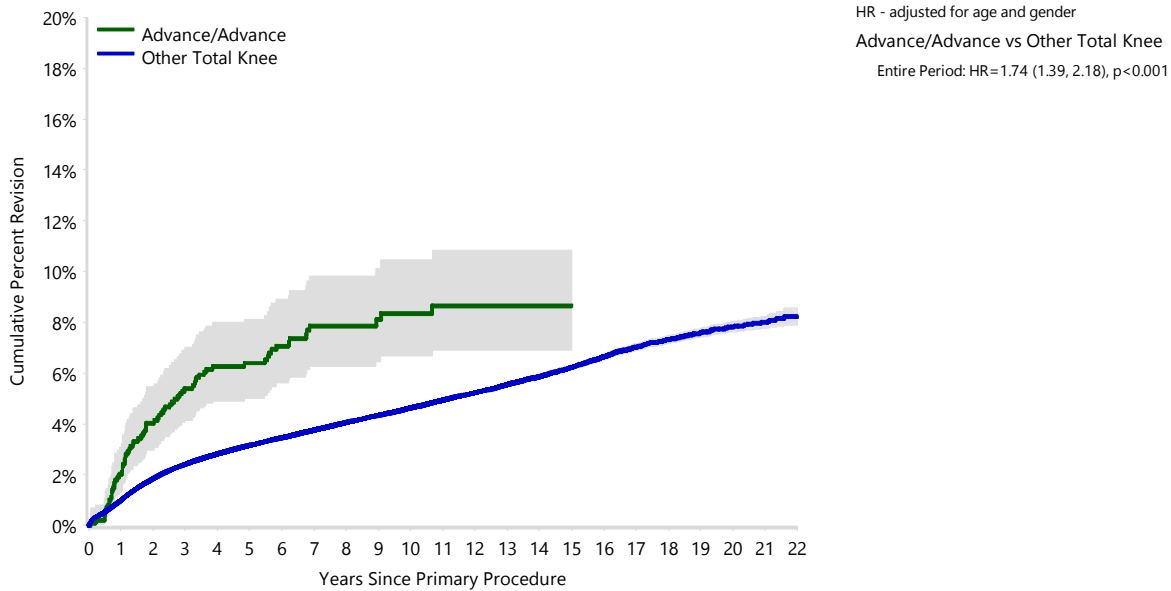
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the Advance/Advance 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



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
Advance/Advance	1009	971	934	889	821	746	645	549	466	371	345	266
Other Total Knee	757619	689569	619326	556553	492545	430901	372523	317918	267026	221370	180235	143333

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
Advance/Advance	165	76	46	42	36	29	19	15	13	8	4
Other Total Knee	111863	85763	65031	47982	34979	24729	16429	9943	5485	2318	538

Note: Prostheses no longer used in 2022 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	Advance/Advance		Other Total Knee	
	Number	Percent	Number	Percent
Osteoarthritis	70	93.3	25983	96.9
Rheumatoid Arthritis	5	6.7	339	1.3
Tumour			162	0.6
Other Inflammatory Arthritis			160	0.6
Osteonecrosis			101	0.4
Fracture			48	0.2
Other			18	0.1
Chondrocalcinosis			1	0.0
TOTAL	75	100.0	26812	100.0

Note: Prostheses no longer used in 2022 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

Revision Diagnosis	Advance/Advance			Other Total Knee		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	12	1.2	16.0	7356	1.0	27.4
Loosening	22	2.2	29.3	6011	0.8	22.4
Instability	9	0.9	12.0	2608	0.3	9.7
Pain	5	0.5	6.7	2034	0.3	7.6
Patellofemoral Pain	5	0.5	6.7	1932	0.3	7.2
Patella Erosion	2	0.2	2.7	1785	0.2	6.7
Arthrofibrosis	7	0.7	9.3	1034	0.1	3.9
Fracture				1023	0.1	3.8
Malalignment	4	0.4	5.3	598	0.1	2.2
Wear Tibial Insert	2	0.2	2.7	368	0.0	1.4
Lysis	2	0.2	2.7	330	0.0	1.2
Incorrect Sizing	1	0.1	1.3	262	0.0	1.0
Patella Maltracking	1	0.1	1.3	185	0.0	0.7
Implant Breakage Tibial Insert				174	0.0	0.6
Bearing Dislocation	2	0.2	2.7	151	0.0	0.6
Implant Breakage Patella				140	0.0	0.5
Metal Related Pathology				107	0.0	0.4
Prosthesis Dislocation				84	0.0	0.3
Synovitis	1	0.1	1.3	74	0.0	0.3
Osteonecrosis				55	0.0	0.2
Implant Breakage Tibial				42	0.0	0.2
Implant Breakage Femoral				39	0.0	0.1
Wear Patella				36	0.0	0.1
Tumour				34	0.0	0.1
Heterotopic Bone				14	0.0	0.1
Wear Tibial				9	0.0	0.0
Progression Of Disease				7	0.0	0.0
Patella Dislocation				2	0.0	0.0
Incorrect Side				1	0.0	0.0
Wear Femoral				1	0.0	0.0
Other				316	0.0	1.2
N Revision	75	7.4	100.0	26812	3.5	100.0
N Primary	1009			757619		

Note: Prostheses no longer used in 2022 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 Advance/Advance 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

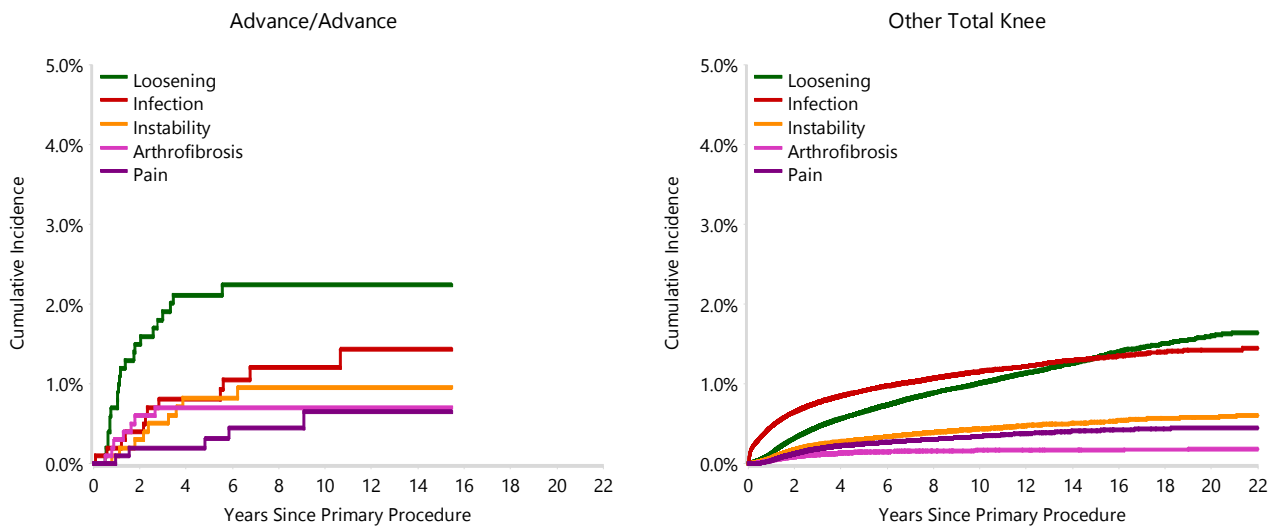


TABLE 5

Type of Revision Performed for Primary Total Knee Replacement

This analysis identifies the components used in the revision of the Advance/Advance 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 Advance/Advance total knee combination compared to all other total knee prostheses.

Table 5: Primary Total Knee Replacement - Type of Revision

Type of Revision	Advance/Advance		Other Total Knee	
	Number	Percent	Number	Percent
TKR (Tibial/Femoral)	33	44.0	6648	24.8
Tibial Component	8	10.7	2130	7.9
Cement Spacer	1	1.3	1363	5.1
Femoral Component	4	5.3	1321	4.9
Removal of Prostheses			154	0.6
Total Femoral			24	0.1
Reinsertion of Components			13	0.0
N Major	46	61.3	11653	43.5
Insert Only	13	17.3	7581	28.3
Patella Only	13	17.3	4725	17.6
Insert/Patella	3	4.0	2771	10.3
Minor Components			64	0.2
Cement Only			18	0.1
N Minor	29	38.7	15159	56.5
TOTAL	75	100.0	26812	100.0

Note: Prostheses no longer used in 2022 are excluded from the comparator.

TABLE 6**Revision Rates of Advance/Advance 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 Advance/Advance Primary Total Knee Replacement by Fixation

Fixation	N Revised	N Total
Cemented	5	59
Cementless	67	926
Hybrid (Tibial Cemented)	1	6
Hybrid (Tibial Cementless)	2	18
TOTAL	75	1009

TABLE 7**Revision Rates of Advance/Advance 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 Advance/Advance Primary Total Knee Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Non XLPE	75	1006
Unknown	0	3
TOTAL	75	1009

TABLE 8**Revision Rates of Advance/Advance 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 Advance/Advance Primary Total Knee Replacement by Bearing Mobility

Bearing Mobility	N Revised	N Total
Fixed	75	1006
Unknown	0	3
TOTAL	75	1009

TABLE 9**Revision Rates of Advance/Advance 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 Advance/Advance Primary Total Knee Replacement by Stability

Stability	N Revised	N Total
Medial Pivot Design	74	970
Posterior Stabilised	1	36
Unknown	0	3
TOTAL	75	1009

TABLE 10

Revision Rates of Primary Total Knee Replacement by State

This enables a state by state variation to be identified for the Advance/Advance 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
Advance/Advance	NSW	23	508
	VIC	4	22
	QLD	2	10
	WA	12	108
	SA	34	361
Other Total Knee	NSW	7950	262241
	VIC	5821	153027
	QLD	5766	157006
	WA	3235	81038
	SA	2966	66404
	TAS	437	18133
	ACT/NT	637	19770
TOTAL		26887	758628

Note: Prostheses no longer used in 2022 are excluded from the comparator.

TABLE 11**Number of Revisions of Advance/Advance Primary Total Knee Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the Advance/Advance 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 2022 has a maximum of one year to be revised, whereas a primary procedure performed in 2020 has a maximum of three years to be revised.

Table 11: Number of Revisions of Advance/Advance Primary Total Knee Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2000	4	15
2001	2	21
2002	0	17
2004	0	8
2005	2	12
2006	0	16
2007	0	2
2008	3	5
2009	2	43
2010	5	115
2011	13	138
2012	4	74
2013	0	7
2014	6	92
2015	8	92
2016	9	100
2017	7	90
2018	4	69
2019	5	58
2020	1	17
2021	0	13
2022	0	5
TOTAL	75	1009

TABLE 12

Revision Rates of Advance/Advance 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 Advance/Advance 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	Fixation
Femoral					
Advance	KFPSNP10-KFPSNP60	PS NONPOROUS FEMORAL COMPONENT	YES		
Advance	KFTCHA1L-KFTCHA6R	CR HA PRIMARY FEMORAL COMPONENT	NO	HA COATED	POROUS
Advance	KFTCNN2L-KFTCNN4R	ADVANCE STATURE CR NONPOROUS FEMORAL COMPONENT	YES		
Advance	KFTCNP0L-KFTCNP6R	CR NONPOROUS PRIMARY FEMORAL COMPONENT	YES		
Advance	KFTCPC0L-KFTCPC6R	CR POROUS PRIMARY FEMORAL COMPONENT	NO		POROUS
Advance	KFTCPN2L-KFTCPN4R	ADVANCE STATURE CR POROUS FEMORAL COMPONENT	NO		POROUS
Tibial					
Advance	KTCCU841-KTCCU841	COCR TIBIAL BASE	YES		
Advance	KTCONP10-KTCONP60	COCR NONPOROUS TIBIAL BASE	YES		
Advance	KTSCFM10-KTSCFM51	BIOFOAM TIBIAL BASE W/ SCREWHOLES TI	NO		
Advance	KTTIHA10-KTTIHA60	TITANIUM HA TIBIAL BASE	NO	HA COATED	POROUS

Table 12: Revised Number of Advance/Advance Primary Total Knee Replacement by Catalogue Number Range

Femoral Range	Tibial Range	N Revised	N Total
KFPSNP10-KFPSNP60	KTCCU841-KTCCU841	0	1
	KTCONP10-KTCONP60	1	35
KFTCHA1L-KFTCHA6R	KTSCFM10-KTSCFM51	2	49
	KTTIHA10-KTTIHA60	16	288
KFTCNN2L-KFTCNN4R	KTTIHA10-KTTIHA60	1	4
KFTCNP0L-KFTCNP6R	KTCONP10-KTCONP60	4	16
	KTTIHA10-KTTIHA60	1	14
KFTCPC0L-KFTCPC6R	KTCONP10-KTCONP60	1	1
	KTSCFM10-KTSCFM51	37	459
	KTTIHA10-KTTIHA60	3	32
KFTCPN2L-KFTCPN4R	KTSCFM10-KTSCFM51	1	28
	KTTIHA10-KTTIHA60	8	82
TOTAL		75	1009