

## 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-2022>.

Note: Procedures using prostheses with no recorded use in 2021 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	70	1004	7216	0.97 (0.76, 1.23)
Other Total Knee	26037	727367	4726554	0.55 (0.54, 0.56)
<b>TOTAL</b>	<b>26107</b>	<b>728371</b>	<b>4733770</b>	<b>0.55 (0.54, 0.56)</b>

Note: Prostheses no longer used in 2021 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
Advance/Advance	2.0 (1.3, 3.1)	4.1 (3.0, 5.5)	5.5 (4.2, 7.1)	6.3 (4.9, 8.0)	6.4 (5.0, 8.2)	7.1 (5.6, 8.9)	7.6 (6.0, 9.6)
Other Total Knee	1.0 (1.0, 1.0)	1.9 (1.9, 1.9)	2.5 (2.4, 2.5)	2.9 (2.9, 2.9)	3.2 (3.2, 3.3)	3.6 (3.5, 3.6)	3.9 (3.8, 3.9)

CPR	8 Yrs	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs
Advance/Advance	7.6 (6.0, 9.6)	7.9 (6.2, 9.9)	8.1 (6.4, 10.2)	8.1 (6.4, 10.2)	8.1 (6.4, 10.2)	8.1 (6.4, 10.2)	8.1 (6.4, 10.2)
Other Total Knee	4.2 (4.1, 4.2)	4.5 (4.4, 4.5)	4.8 (4.7, 4.8)	5.1 (5.0, 5.2)	5.4 (5.3, 5.5)	5.7 (5.7, 5.8)	6.1 (6.0, 6.1)

CPR	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs
Advance/Advance	8.1 (6.4, 10.2)						
Other Total Knee	6.4 (6.3, 6.6)	6.9 (6.7, 7.0)	7.3 (7.1, 7.4)	7.6 (7.4, 7.8)	7.9 (7.7, 8.1)	8.2 (7.9, 8.4)	8.2 (8.0, 8.5)

Note: Prostheses no longer used in 2021 are excluded from the comparator.

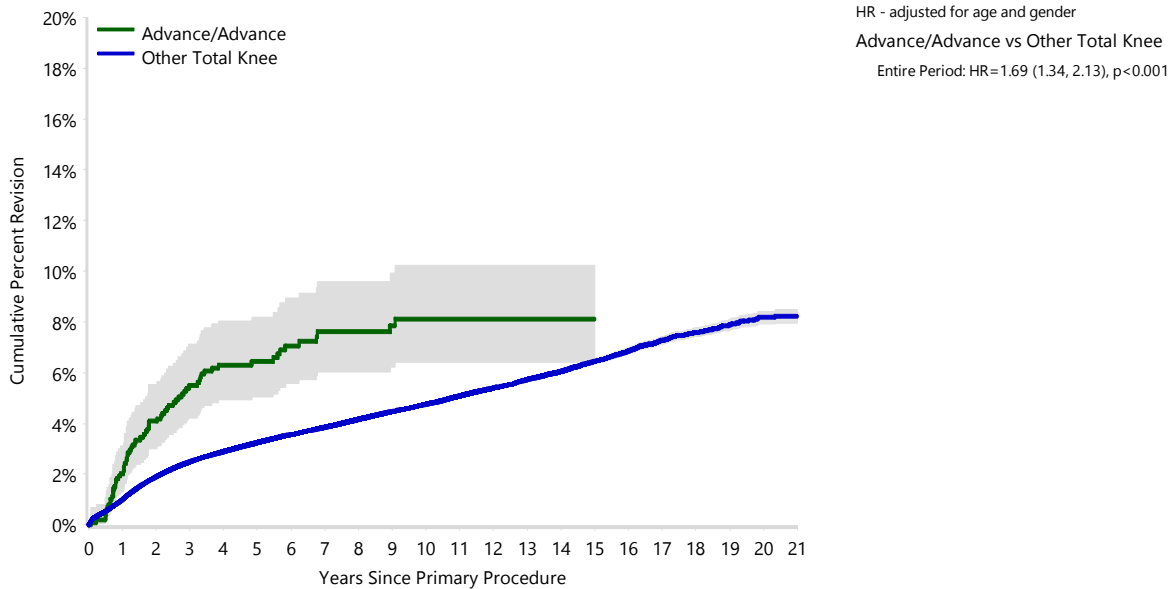
**FIGURE 1**

**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
Advance/Advance	1004	958	918	839	759	668	564	473	392	365	286
Other Total Knee	727367	657225	592472	526955	463806	403468	346919	293559	245547	202460	163379

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
Advance/Advance	169	83	47	44	40	30	28	16	15	8	4
Other Total Knee	128781	99081	75508	56464	41646	29594	19587	11951	6488	2686	605

Note: Prostheses no longer used in 2021 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	65	92.9	25230	96.9
Rheumatoid Arthritis	5	7.1	328	1.3
Other Inflammatory Arthritis			161	0.6
Tumour			151	0.6
Osteonecrosis			98	0.4
Fracture			49	0.2
Other			19	0.1
Chondrocalcinosis			1	0.0
<b>TOTAL</b>	<b>70</b>	<b>100.0</b>	<b>26037</b>	<b>100.0</b>

Note: Prostheses no longer used in 2021 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	11	1.1	15.7	6981	1.0	26.8
Loosening	21	2.1	30.0	5831	0.8	22.4
Instability	8	0.8	11.4	2488	0.3	9.6
Pain	5	0.5	7.1	2061	0.3	7.9
Patellofemoral Pain	4	0.4	5.7	2047	0.3	7.9
Patella Erosion	2	0.2	2.9	1693	0.2	6.5
Arthrofibrosis	7	0.7	10.0	996	0.1	3.8
Fracture				944	0.1	3.6
Malalignment	4	0.4	5.7	599	0.1	2.3
Wear Tibial Insert	2	0.2	2.9	364	0.1	1.4
Lysis	1	0.1	1.4	344	0.0	1.3
Incorrect Sizing	1	0.1	1.4	259	0.0	1.0
Patella Maltracking	1	0.1	1.4	180	0.0	0.7
Bearing Dislocation	2	0.2	2.9	153	0.0	0.6
Implant Breakage Tibial Insert				150	0.0	0.6
Implant Breakage Patella				134	0.0	0.5
Metal Related Pathology				117	0.0	0.4
Prosthesis Dislocation				80	0.0	0.3
Synovitis	1	0.1	1.4	77	0.0	0.3
Osteonecrosis				58	0.0	0.2
Implant Breakage Tibial				42	0.0	0.2
Implant Breakage Femoral				38	0.0	0.1
Wear Patella				33	0.0	0.1
Tumour				28	0.0	0.1
Heterotopic Bone				15	0.0	0.1
Wear Tibial				12	0.0	0.0
Progression Of Disease				6	0.0	0.0
Patella Dislocation				2	0.0	0.0
Wear Femoral				2	0.0	0.0
Incorrect Side				1	0.0	0.0
Other				302	0.0	1.2
<b>N Revision</b>	<b>70</b>	<b>7.0</b>	<b>100.0</b>	<b>26037</b>	<b>3.6</b>	<b>100.0</b>
<b>N Primary</b>	<b>1004</b>			<b>727367</b>		

Note: Prostheses no longer used in 2021 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**

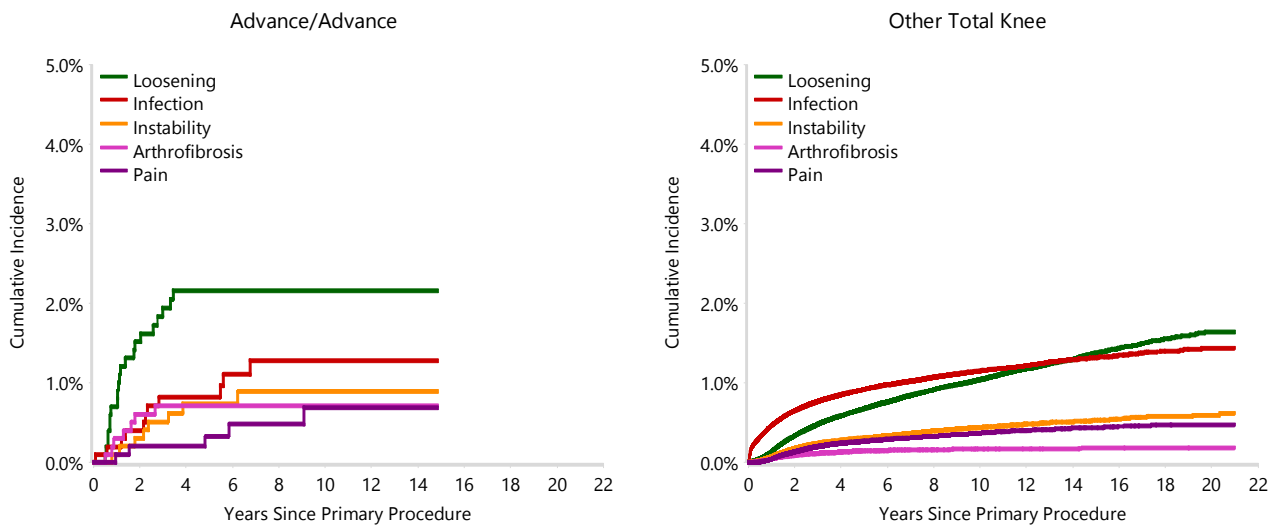


TABLE 5

**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)	30	42.9	6410	24.6
Tibial Component	8	11.4	2094	8.0
Cement Spacer	1	1.4	1360	5.2
Femoral Component	4	5.7	1310	5.0
Removal of Prostheses			150	0.6
Total Femoral			21	0.1
Reinsertion of Components			11	0.0
<b>N Major</b>	<b>43</b>	<b>61.4</b>	<b>11356</b>	<b>43.6</b>
Insert Only	12	17.1	7121	27.3
Patella Only	12	17.1	4778	18.4
Insert/Patella	3	4.3	2709	10.4
Minor Components			59	0.2
Cement Only			14	0.1
<b>N Minor</b>	<b>27</b>	<b>38.6</b>	<b>14681</b>	<b>56.4</b>
<b>TOTAL</b>	<b>70</b>	<b>100.0</b>	<b>26037</b>	<b>100.0</b>

Note: Prostheses no longer used in 2021 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	62	921
Hybrid (Tibial Cemented)	1	6
Hybrid (Tibial Cementless)	2	18
<b>TOTAL</b>	<b>70</b>	<b>1004</b>

**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	70	1001
Unknown	0	3
<b>TOTAL</b>	<b>70</b>	<b>1004</b>



**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	70	1001
Unknown	0	3
<b>TOTAL</b>	<b>70</b>	<b>1004</b>

**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	69	965
Posterior Stabilised	1	36
Unknown	0	3
<b>TOTAL</b>	<b>70</b>	<b>1004</b>

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	21	507
	VIC	4	22
	QLD	2	10
	WA	12	108
	SA	31	357
Other Total Knee	NSW	7713	252927
	VIC	5549	144467
	QLD	5690	153169
	WA	3225	77804
	SA	2836	63429
	TAS	418	16885
	ACT/NT	606	18686
<b>TOTAL</b>		<b>26107</b>	<b>728371</b>

Note: Prostheses no longer used in 2021 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 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 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	12	138
2012	4	74
2013	0	7
2014	6	92
2015	8	92
2016	6	100
2017	7	90
2018	3	69
2019	5	58
2020	1	17
2021	0	13
<b>TOTAL</b>	<b>70</b>	<b>1004</b>

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
<b>Femoral</b>					
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
<b>Tibial</b>					
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	15	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	33	455
	KTTIHA10-KTTIHA60	3	32
KFTCPN2L-KFTCPN4R	KTSCFM10-KTSCFM51	1	27
	KTTIHA10-KTTIHA60	8	82
<b>TOTAL</b>		<b>70</b>	<b>1004</b>