Active Knee (cementless)/Active Knee Total Knee Investigation

Note: This analysis compares the Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee 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)
Active Knee (class)/Active Knee	721	7214	77613	0.93 (0.86, 1.00)
Other Total Knee	25340	720481	4651511	0.54 (0.54, 0.55)
TOTAL	**26061**	**727695**	**4729125**	**0.55 (0.54, 0.56)**

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 Active Knee (class)/Active Knee 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
Active Knee (class)/Active Knee	1.1 (0.9, 1.4)	2.6 (2.3, 3.0)	3.6 (3.2, 4.0)	4.4 (4.0, 4.9)	5.0 (4.6, 5.6)	5.7 (5.2, 6.3)	6.6 (6.0, 7.2)
Other Total Knee	1.0 (1.0, 1.0)	1.9 (1.9, 1.9)	2.5 (2.4, 2.5)	2.9 (2.8, 2.9)	3.2 (3.2, 3.3)	3.5 (3.5, 3.6)	3.8 (3.8, 3.9)

CPR	8 Yrs	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs
Active Knee (class)/Active Knee	7.6 (6.9, 8.2)	8.2 (7.6, 8.9)	8.8 (8.2, 9.6)	9.7 (9.0, 10.5)	10.5 (9.8, 11.4)	11.2 (10.4, 12.1)	11.6 (10.8, 12.5)
Other Total Knee	4.1 (4.1, 4.2)	4.4 (4.3, 4.5)	4.7 (4.6, 4.8)	5.0 (4.9, 5.1)	5.3 (5.2, 5.4)	5.6 (5.5, 5.7)	5.9 (5.8, 6.0)

CPR	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs
Active Knee (class)/Active Knee	12.5 (11.6, 13.5)	13.8 (12.7, 14.9)	14.4 (13.3, 15.6)	14.8 (13.6, 16.1)	14.8 (13.6, 16.1)		
Other Total Knee	6.3 (6.2, 6.4)	6.7 (6.6, 6.8)	7.1 (6.9, 7.2)	7.4 (7.2, 7.6)	7.7 (7.5, 7.9)	8.0 (7.7, 8.2)	8.0 (7.8, 8.3)

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

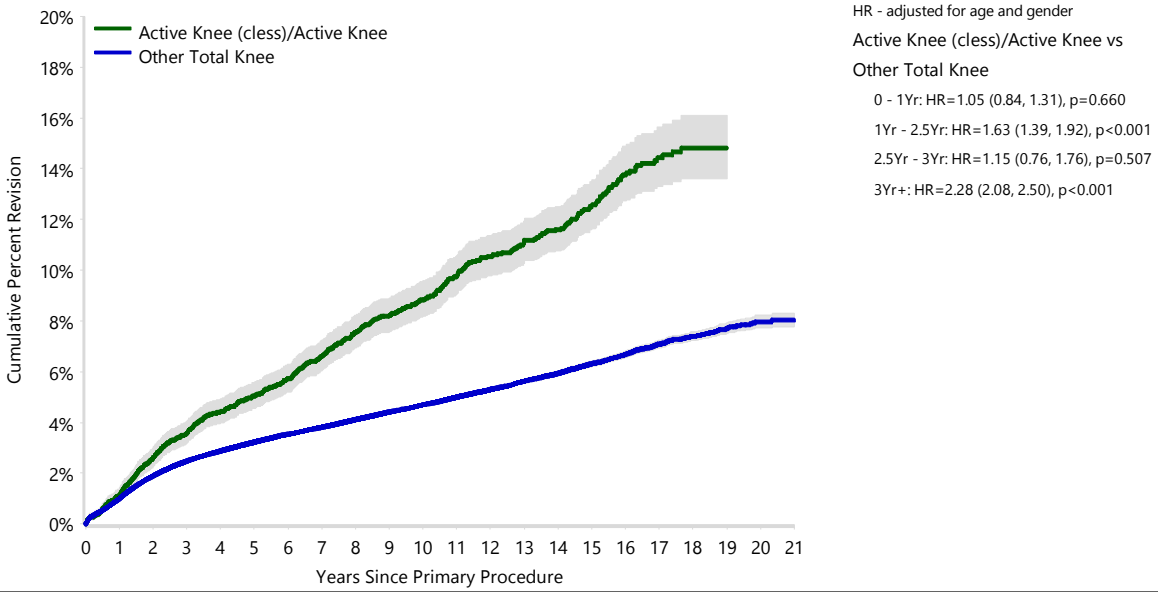
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the Active Knee (class)/Active Knee 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
Active Knee (class)/Active Knee	7214	7078	6881	6724	6546	6316	6021	5542	5090	4564	4030
Other Total Knee	720481	650450	585879	520495	457495	397375	341111	288226	240662	198085	159472

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
Active Knee (class)/Active Knee	3431	2938	2519	2087	1631	1254	823	417	112	10	0
Other Total Knee	125412	96171	73008	54394	40029	28347	18770	11536	6378	2677	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

	Active Knee (cless)/Active Knee		Other Total Knee	
Primary Diagnosis	Number	Percent	Number	Percent
Osteoarthritis	704	97.6	24547	96.9
Rheumatoid Arthritis	8	1.1	323	1.3
Other Inflammatory Arthritis	3	0.4	158	0.6
Tumour			151	0.6
Osteonecrosis	5	0.7	93	0.4
Fracture			49	0.2
Other			19	0.1
Chondrocalcinosis	1	0.1		
TOTAL	**721**	**100.0**	**25340**	**100.0**

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	Active Knee (cless)/Active Knee			Other Total Knee		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	99	1.4	13.7	6882	1.0	27.2
Loosening	145	2.0	20.1	5696	0.8	22.5
Instability	76	1.1	10.5	2414	0.3	9.5
Pain	59	0.8	8.2	2005	0.3	7.9
Patellofemoral Pain	77	1.1	10.7	1971	0.3	7.8
Patella Erosion	70	1.0	9.7	1623	0.2	6.4
Arthrofibrosis	29	0.4	4.0	968	0.1	3.8
Fracture	42	0.6	5.8	902	0.1	3.6
Malalignment	13	0.2	1.8	590	0.1	2.3
Wear Tibial Insert	20	0.3	2.8	344	0.0	1.4
Lysis	19	0.3	2.6	326	0.0	1.3
Incorrect Sizing	1	0.0	0.1	258	0.0	1.0
Patella Maltracking	1	0.0	0.1	180	0.0	0.7
Bearing Dislocation	2	0.0	0.3	151	0.0	0.6
Implant Breakage Tibial Insert				150	0.0	0.6
Metal Related Pathology	1	0.0	0.1	116	0.0	0.5
Implant Breakage Patella	50	0.7	6.9	84	0.0	0.3
Prosthesis Dislocation	1	0.0	0.1	79	0.0	0.3
Synovitis	2	0.0	0.3	76	0.0	0.3
Osteonecrosis	4	0.1	0.6	54	0.0	0.2
Implant Breakage Tibial	2	0.0	0.3	40	0.0	0.2
Implant Breakage Femoral	1	0.0	0.1	37	0.0	0.1
Wear Patella	1	0.0	0.1	32	0.0	0.1
Tumour				28	0.0	0.1
Heterotopic Bone	1	0.0	0.1	14	0.0	0.1
Wear Tibial	1	0.0	0.1	11	0.0	0.0
Progression Of Disease	1	0.0	0.1	5	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	3	0.0	0.4	299	0.0	1.2
N Revision	**721**	**10.0**	**100.0**	**25340**	**3.5**	**100.0**
N Primary	**7214**			**720481**		

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 Active Knee (class)/Active Knee 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

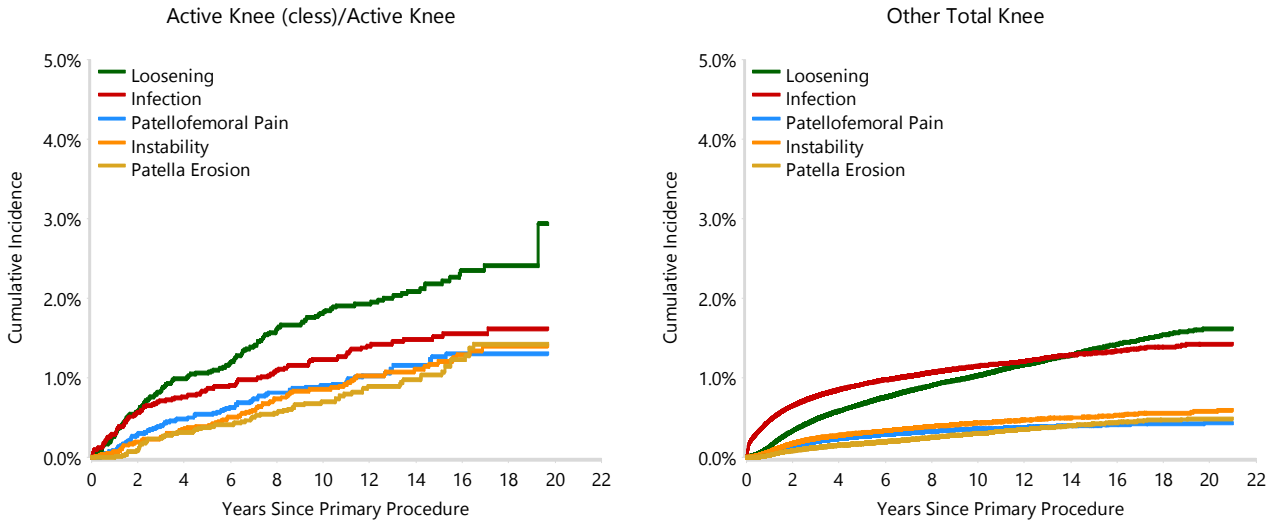


TABLE 5

Type of Revision Performed for Primary Total Knee Replacement

This analysis identifies the components used in the revision of the Active Knee (cless)/Active Knee 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 Active Knee (cless)/Active Knee total knee combination compared to all other total knee prostheses.

Table 5: Primary Total Knee Replacement - Type of Revision

	Active Knee (cless)/Active Knee		Other Total Knee	
Type of Revision	Number	Percent	Number	Percent
TKR (Tibial/Femoral)	210	29.1	6209	24.5
Tibial Component	34	4.7	2066	8.2
Cement Spacer	15	2.1	1345	5.3
Femoral Component	28	3.9	1283	5.1
Removal of Prostheses	2	0.3	148	0.6
Total Femoral			21	0.1
Reinsertion of Components			11	0.0
N Major	**289**	**40.1**	**11083**	**43.7**
Insert Only	122	16.9	7001	27.6
Patella Only	120	16.6	4663	18.4
Insert/Patella	190	26.4	2520	9.9
Minor Components			59	0.2
Cement Only			14	0.1
N Minor	**432**	**59.9**	**14257**	**56.3**
TOTAL	**721**	**100.0**	**25340**	**100.0**

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

TABLE 6

Revision Rates of Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee Primary Total Knee Replacement by Fixation

Fixation	N Revised	N Total
Cemented	1	16
Cementless	565	4899
Hybrid (Tibial Cemented)	155	2299
TOTAL	**721**	**7214**

TABLE 7

Revision Rates of Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee Primary Total Knee Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Non XLPE	721	7211
Unknown	0	3
TOTAL	**721**	**7214**

TABLE 8

Revision Rates of Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee Primary Total Knee Replacement by Bearing Mobility

Bearing Mobility	N Revised	N Total
Fixed	719	7203
Rotating - Sliding	2	8
Unknown	0	3
TOTAL	**721**	**7214**

TABLE 9

Revision Rates of Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee Primary Total Knee Replacement by Stability

Stability	N Revised	N Total
Minimally Stabilised	721	7211
Unknown	0	3
TOTAL	**721**	**7214**

TABLE 10

Revision Rates of Primary Total Knee Replacement by State

This enables a state by state variation to be identified for the Active Knee (cless)/Active Knee 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
Active Knee (cless)/Active Knee	NSW	414	3937
	VIC	240	2735
	QLD	22	95
	WA	44	440
	TAS	1	7
Other Total Knee	NSW	7308	249184
	VIC	5313	141752
	QLD	5668	153076
	WA	3191	77465
	SA	2837	63440
	TAS	417	16878
	ACT/NT	606	18686
TOTAL		**26061**	**727695**

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

TABLE 11

Number of Revisions of Active Knee (class)/Active Knee Primary Total Knee Replacement by Year of Implant

This analysis details the number of prostheses reported each year to the Registry for the Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee Primary Total Knee Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2001	0	18
2002	33	203
2003	69	613
2004	97	790
2005	76	693
2006	37	466
2007	41	510
2008	58	483
2009	37	412
2010	49	479
2011	79	601
2012	51	500
2013	38	427
2014	26	319
2015	15	336
2016	6	176
2017	5	91
2018	2	35
2019	1	21
2020	0	24
2021	1	17
TOTAL	**721**	**7214**

TABLE 12

Revision Rates of Active Knee (class)/Active Knee 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 Active Knee (class)/Active Knee 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					
Active Knee	1015210001-1015220026	V1 CEMENTLESS FEMORAL IMPLANT	NO	HA COATED	BEADED
Active Knee	1015210202-1015220230	V2 CEMENTLESS FEMORAL IMPLANT	NO	HA COATED	BEADED
Active Knee	1015210210-1015220329	V3 CEMENTLESS FEMORAL IMPLANT	NO	HA COATED	BEADED
Tibial					
Active Knee	1015130300-1015130309	V2 CEMENTLESS TIBIAL IMPLANT	NO	HA COATED	BEADED
Active Knee	1015130400-1015130409	V3 CEMENTLESS TIBIAL IMPLANT STEMMED	NO	HA COATED	BEADED
Active Knee	1015130500-1015130509	V3 CEMENTED TIBIAL IMPLANT STEMMED	YES		POLISHED
Active Knee	1015130550-1015130559	MOBILE TIBIAL IMPLANT	NO	HA COATED	BEADED
Active Knee	10AKTRCTI1A-10AKTRCTI5B	REVISION CEMENTED TIBIAL IMPLANT W/TIBIAL STEM	YES		POLISHED

Table 12: Revised Number of Active Knee (class)/Active Knee Primary Total Knee Replacement by Catalogue Number Range

Femoral Range	Tibial Range	N Revised	N Total
1015210001-1015220026	1015130300-1015130309	286	2288
	1015130400-1015130409	0	14
	1015130500-1015130509	49	586
	1015130550-1015130559	0	1
1015210202-1015220230	1015130300-1015130309	47	577
	1015130400-1015130409	54	504
	1015130500-1015130509	35	460
	1015130550-1015130559	2	7
	10AKTRCTI1A-10AKTRCTI5B	0	1
1015210210-1015220329	1015130300-1015130309	40	282
	1015130400-1015130409	140	1247
	1015130500-1015130509	64	1241
	10AKTRCTI1A-10AKTRCTI5B	4	6
TOTAL		**721**	**7214**